CONTESTING THE EFFICIENT MARKET HYPOTHESIS FOR THE CHICAGO BOARD OF TRADE CORN FUTURES CONTRACT THROUGH THE APPLICATION OF A DERIVATIVE METHODOLOGY

by

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I hereby declare that "*Contesting the efficient market hypothesis for the Chicago Board of Trade corn futures contract through the application of a derivative methodology"* is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____ _____

SIGNATURE DATE

(W Rossouw)

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SUMMARY

Corn production is scattered geographically over various continents, but most of it is grown in the United States. As such, the world price of corn futures contracts is largely dominated by North American corn prices as traded on the Chicago Board of Trade. In recent years, this market has been characterised by an increase in price volatility and magnitude of price movement as a result of decreasing stock levels. The development and implementation of an effective and successful derivative price risk management strategy based on the Chicago Board of Trade corn futures contract will therefore be of inestimable value to market stakeholders worldwide.

The research focused on the efficient market hypothesis and the possibility of contesting this phenomenon through an application of a derivative price risk management methodology. The methodology is based on a combination of an analysis of market trends and technical oscillators with the objective of generating returns superior to that of a market benchmark.

The study found that market participants are currently unable to exploit price movement in a manner which results in returns that contest the notion of efficient markets. The methodology proposed, however, does allow the user to consistently achieve returns superior to that of a predetermined market benchmark. The benchmark price for the purposes of this study was the average price offered by the market over the contract lifetime, and such, the efficient market hypothesis was successfully contested.

Key terms:

CBOT; derivative instruments; futures contracts; options contracts; price risk management methodology; volatility; technical oscillators; trends; efficient market hypothesis; benchmark

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

Worldwide, roughly 829 million tons of corn is produced on an annual basis (USDA 2012). Even though the production of corn is geographically spread over the continents, the bulk of it is produced in the United States (Figure 1.1). On average, producers in the United States harvest in excess of 400 million tons of corn from approximately 90 million acres of plantings (Figure 1.2). It can therefore be logically concluded that the world price of corn is determined to a large extent by North American corn prices.

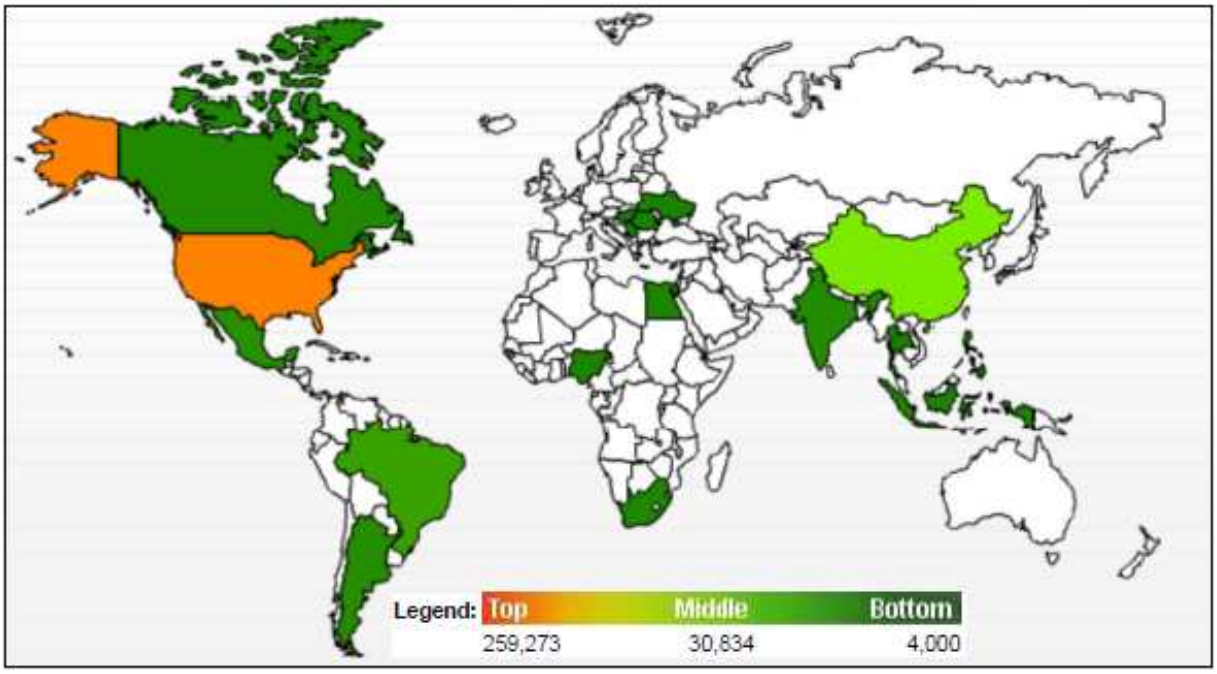

Figure 1.1 Worldwide geographical production of corn

Source: NationMaster (2012)

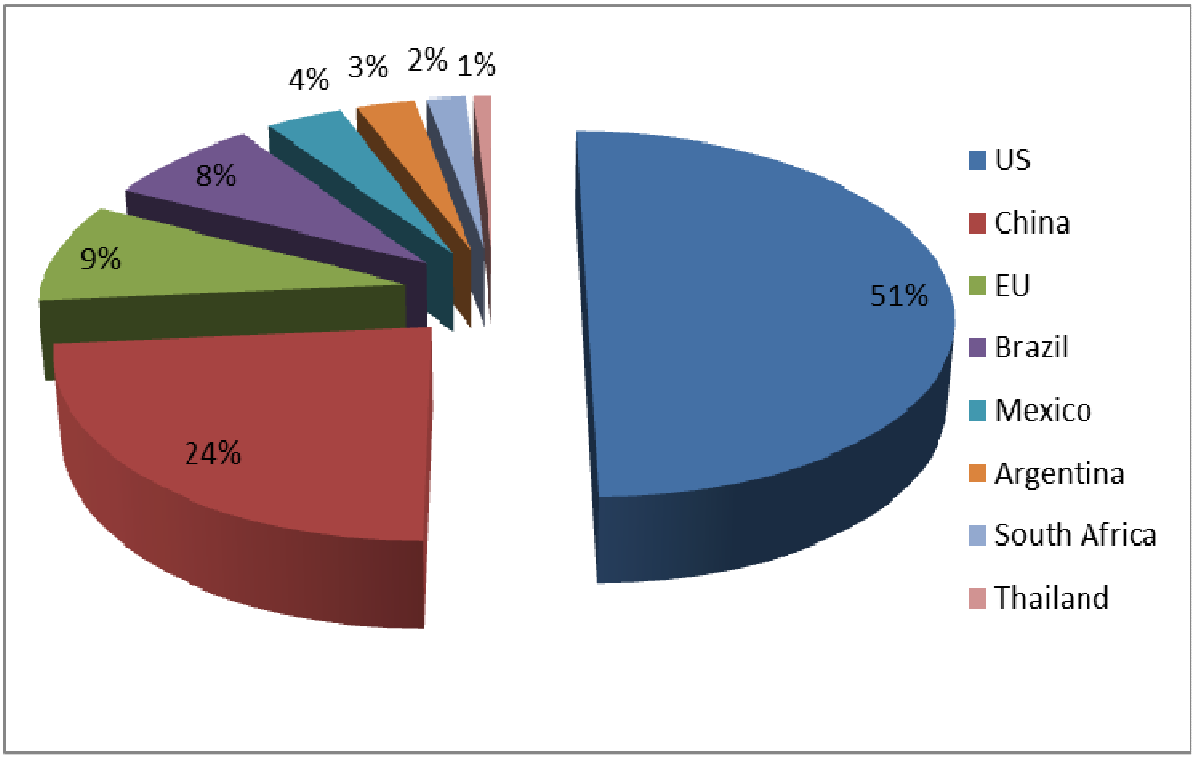

Figure 1.2 Major corn producing countries

Source: World Commodity Analysis Corporation (2012)

Ever since the inception of the Chicago Board of Trade (otherwise known as CBOT) in 1848, participants in the agricultural soft commodities market have had to adapt to a challenging and volatile futures market highlighted by extreme price movements. According to Irwin and Good (2009), compelling evidence exists that the CBOT corn futures contract is on the brink of new era of exceptional high volatility with increased uncertainty regarding the future price levels of corn futures contracts.

Irwin and Good (2009) state that the probable magnitude and volatility of future corn price movements are highlighted by reference to the shift in nominal prices over two previous periods. The first period entails 1947 to 1972, a period characterised by the suspension of price controls, while the second period from 1972 to 2006 is known as a period of escalating energy prices and rapid inflation. The average monthly corn price increase between these periods was close to 89%. Another structural change in corn prices occurred in 2006, resulting in the start of a new period of commodity prices.

Whereas the price of corn was previously determined by its feeding value to livestock (Good, Hieronymus & Hinton 1980), ethanol production currently explains 90% of all corn

price fluctuations. In addition, the demand growth from developing nations coupled with the current US monetary policy will result in a further surge in prices (Trostle 2008). This can be attributed to higher interest rates reducing the demand for storable commodities leading to a price decline, while the current lower levels of interest rates result in a higher appetite among processors to carry inventory, which subsequently give way to higher prices. Similarly, a weaker exchange rate will lead to demand growth from foreign buyers, which results in higher prices. These structural shifts in nominal prices, coupled with ever-increasing levels of volatility, is the least manageable factor threatening the existence of market participants (Nivens, Kastens & Dhuyvetter 2002) and have stressed producers, processors and speculators literally beyond the breaking point. Uncertainty regarding the most appropriate and effective hedging and/or speculative methodology to be implemented under ever-changing technical and fundamental market conditions remains the single biggest shortcoming of market participants in their effort to mitigate price risks inherent in the futures market successfully.

Research conducted on the effect of volatile prices on the income of producers identified price risk as one of the greatest sources of risk faced by US producers (Patrick & Ullerich 1996; Coble, Patrick, Knight & Baquet 1999). This is supported by the findings of Smith (1989) who concluded that 79% of producers rate the marketing of crops as very important to the financial success of their operations. It is commonly accepted that, from a hedging point of view, producers substantially under-perform the market. The well-known adage that producers market two-thirds of their crop in the bottom third of the price range supports the view that marketing, more than production skills, determine net farm income (Irwin, Good, Martines-Filho & Batts 2006). Even though producers have a variety of price risk management tools at their disposal, research has confirmed the limited use of derivative instruments in the hedging process by producers. This statement is highlighted by the research findings of Goodwin and Schroeder (1994) who determined that only 10.4% of a sample of Kansas farmers hedge corn prices through the futures market. The limited use of derivative instruments can be ascribed to a lack of knowledge regarding the workings of the futures market (Harwood, Heifner, Coble, Perry & Somwaru 1999) as well as the complexity of marketing strategies.

Processors and market advisory services similarly have a difficult time in managing the effect of volatile corn futures prices on their operations. The dramatic surge in corn prices

to new record highs in the spring and summer of 2008 was the reason behind the bankruptcy of various US processors. These include VeraSun, one of the most prominent ethanol manufacturers in the world, and Pilgrim's Pride, the second largest poultry processor in the US. This underlines the timing of purchases as the most important implication of the magnitude of price volatility (Irwin & Good 2009). In addition, higher corn prices influence the amount of capital required by merchandisers to purchase corn stocks. Effective hedging will therefore result in less capital needed in order to maintain margin accounts on hedged ownership. Irwin et al. (2006) evaluated the success of recommendations by market advisory services over the period 1995 to 2004. The results of the study indicated that market advisory services struggle to outperform the market and have only a marginal chance of providing better returns than a passive strategy, especially after considering risk.

Speculators have been active participants in the futures market ever since the turn of the 20th century. The earliest research on speculative transactions exclusively on grain was done by Stewart (1934), who evaluated 9 000 accounts of a brokers' firm over the period 1925 to 1934. Stewart concluded the research project by stating that 75% of speculative accounts had negative variation margin flows, i.e. they lost money. In addition, and of even greater concern to speculators, is the fact that the research sample from Stewart indicated speculative losses six times the value of total speculative gains. In 2001, Wang published his report on the predictability of returns in the futures market. He concluded that large speculators in the futures market are still unable to predict future grain price movements accurately.

The fact that none of the mentioned market participants possess the necessary marketing skills to manage price volatility and market movement effectively has resulted in various references in literature on the possibility of developing strategies with the objective of providing returns superior to those offered by the corn futures market. The views expressed by researchers and economists can be classified into two broad groups: supporters of the efficient market hypothesis concluding that it is impossible to consistently outperform a pre-determined benchmark versus researchers stating that superior analytical ability will provide opportunities to exploit market movements.

Tomek (1997) argues that price forecasting based upon quantitative strategies cannot improve on existing futures prices as forecasting agents and that such empirical strategies provide poor price forecasts. This view is supported by Nivens et al. (2002), who state that efforts in trying to pick high prices in the futures market will result in disappointing returns for market participants. Brorsen and Irwin (1996) found that numerous deviations from market efficiency have been reported in literature, but due to the omissible impact of the stated deviations, traders will not be able to exploit them. In addition to the view that the market cannot be outperformed, economists have not reached consensus on an optimal hedge for commodity prices and this enhances the belief that no strategy exists which provides above average returns (Tomek & Peterson 2000).

In contrast to the findings above Wisner, Blue and Baldwin (1998) identify a number of trading strategies with a distinct profit potential, as long as these strategies can be identified *ex ante*. They suggest that the pre-harvest implementation of derivative instruments may increase returns versus sales during harvest, due to seasonal price patterns. This is in line with the conclusions of Zulauf and Irwin (1998) which state that individuals may be able to outperform the market should they have superior access to information or a superior analytical ability, and that superior returns for short hedgers can be achieved by selling systematically overvalued contracts.

It is evident that the debate on price forecasting and the possibility of achieving superior returns is still raging on. Of importance is the absence of literature on the existence of a single strategy which can exploit market phenomena and be applied successfully to all market participants, encompassing both long- and short-position holders. In the development of a derivative price risk management methodology, it is necessary to translate statistical significance into economic significance, as the purpose of such a strategy should be to increase social welfare. This is of particular relevance since economists' research on marketing strategies has been used little in the financial and agricultural markets (Brorsen & Irwin 1996). In order to gain acceptance, direct empirical evidence should be provided in which the strategy is confronted with actual data. A pre-determined market benchmark should confirm the performance results of the strategy, similar to common stock performance being compared to a stock index. The commonly used benchmark for grain futures prices is the average price offered by the market over the duration of the strategy (Irwin et al. 2006). It is therefore relevant and of interest to all

market participants to determine the possibility of refuting the efficient market hypothesis. This will be achieved through an analysis of technical indicators in conjunction with the application of a single derivative risk management methodology in such a manner that the market return (i.e. efficient market hypothesis) is outperformed and adverse price movements are effectively mitigated in order to minimise the impact of changing market prices.

1.2 PROBLEM STATEMENT

The research problem was formulated as follows:

What is the possibility of accurately forecasting future price movements for the CBOT corn futures contract through technical analysis in such a manner that a single derivative price risk management methodology can be formulated for simultaneous use by long hedgers, short hedgers and speculators which will mitigate price risk, while still providing the user with a force majeure and resulting in returns which successfully contest the efficient market hypothesis?

The defined research problem was of general nature and was therefore divided into the following sub-questions:

- Is it possible to forecast future price trends accurately through an analysis of technical indicators?

- Which technical indicators should be applied in order to identify and determine future price movements with the objective of exploiting market trends?

- Will the study be relevant and feasible to all market participants (long- and short-position holders) of derivative instruments on the CBOT?

- What is the possibility of applying a single hedging/speculative derivative risk management model to futures prices on an annual basis notwithstanding the existence of a bullish/bearish/neutral market?

- Can the proposed methodology be developed in a manner that incorporates a worst-case futures price level at inception of the strategy, while still allowing for improved realized prices should market prices trend favourably?

- What is the importance and significance of a force majeure characteristic?

- What is the general accepted price benchmark in the soft commodities futures market against which results obtained from the application of the methodology should be compared?

- Do results achieved from the implementation of the hedging/speculative methodology emphasise the benefits of an actively managed strategy versus those of a passive strategy?

The researcher conducted previous research on price risk management for exclusively long-position holders (processors) in the South African futures market (Rossouw 2008; Rossouw & Young 2009). Economists worldwide have devoted much time and effort in analysing futures markets with the objective of developing risk management strategies that will increase profits. These studies reported varying conclusions. To date, no scientific research has been documented on the possibility of successfully contrasting the efficient market hypothesis for the CBOT corn futures contract through technical analysis and an application of a single derivative price risk management methodology for both long- and short-position holders, as well as speculators.

1.3 RESEARCH OBJECTIVES

The initial objective of the study was to determine the effectiveness by which soft commodity market participants on the CBOT mitigate the risk of adverse price movements

on the underlying futures contract. An indication that market participants do not possess the necessary derivative trading knowledge and risk management skills to hedge themselves against volatile market movements will result in the evaluation of price and volatility movements of corn futures contracts on the CBOT.

Price and volatility evaluation was done through an analysis of the appropriate technical indicators and market trends with the objective of accurately forecasting future market trends and overbought/oversold market conditions. Once this had been achieved successfully, hedging methodologies which can be applied to futures contracts were developed in a manner by which market movement can be exploited for the ultimate benefit of the user.

Once the most appropriate methodology had been formulated, it was applied to historical data in order to ascertain the feasibility of such a methodology to potential users. In order to ensure scientific credibility, the methodology will also be applied to a series of data obtained through random sampling. The objective was to obtain results superior to that of a pre-determined market benchmark. The performance of the proposed methodology was compared to the performance of market advisory services in the agricultural sector as well as the performance of fund managers in alternative markets.

1.4 THE IMPORTANCE AND BENEFITS OF THE STUDY

The importance and benefits of research on the possibility of accurately forecasting future price movements through technical analysis and the development of risk management methodologies with the objective of successfully contrasting the efficient market hypothesis for the CBOT corn futures contract can be summarised as follows:

1.4.1 Importance from a South African perspective. The soft commodity futures market in South Africa operates within a free-market environment with no direct government intervention. As such, changes in the world markets of corresponding commodities have a direct impact on domestic prices. Import and export parity prices act as ceiling and floor prices respectively for the underlying commodity.

Import parity is a calculable price level at which a specific commodity can be imported from foreign countries. Once the SAFEX price moves beyond this level, demand for the local product tends to decline as imports of the product increase. The flagging demand for the local product generally forces prices back to levels lower than import parity. *Export parity* is a calculable price level at which a specific commodity can be exported to foreign countries. Once the SAFEX price moves lower than this level, demand for the local product tends to increase as exports of the product flourish. This higher demand for the local product generally forces prices back to levels higher than export parity.

The United States is the single biggest producer of corn worldwide and therefore market variability on the CBOT has a direct impact on South African maize prices. This can be attributed to the CBOT price of corn being the biggest variable in the calculation of the respective parities. By hedging themselves on the CBOT corn contract, South African producers can minimise the effect of a decrease in international prices and lower export parity price levels as a result of lower corn prices. Similarly, South African processors can hedge themselves on the CBOT with the objective of minimising the effect of an increase in international prices and higher import parity price levels as a result of stronger corn prices.

1.4.2 Importance from an academic perspective. On achieving the research objective of successfully contrasting the efficient market hypothesis, increased attention was focused on the possibility of developing comparable strategies in alternative markets.

1.4.3 Importance to direct stakeholders. The mitigation of price volatility and the resultant superior returns achieved through the application of the pricing methodology will lead to the realisation of the objective of the methodology, i.e. an increase in social welfare achieved through an increase in profit and market share.

1.4.4 Importance to indirect stakeholders. A complacent approach to hedging by direct stakeholders will ultimately be borne by consumers. More effective hedging strategies will address the effect of adverse market movements on indirect stakeholders.

1.4.5. Importance of a force majeure characteristic. Once the expected future price trend has been forecasted through an analysis of the appropriate technical indicators, a derivative risk management methodology will be applied with the objective of achieving results which will refute the efficient market hypothesis. This methodology consists of options underlying the specific futures contract. A distinct feature of options contracts is their flexibility, since they provide the holder with the right but not the obligation to enter into a futures contract. This is of particular interest to long position holders wishing to decrease the size of the contract due to lower than expected usage and short position holders with a smaller than expected crop.

1.5 RESEARCH STRUCTURE

The study can be divided into four distinct parts:

- **Part 1.** The first part of the research study involves an extensive literature review on derivative instruments, the mathematics underlying futures and options contracts as well as the variables determining the price level of futures contracts and option premiums.

- **Part 2.** The concept of 'price volatility', its determinants as well as its relevance to corn futures prices form the basis of the second part of the research study. The impact of corn price volatility on market stakeholders is discussed and the price risk management success of producers, processors and speculators is determined. Reasons for the inability of stakeholders to mitigate price risk are presented.

- **Part 3.** The efficient market hypothesis is defined and discussed, and its legitimacy is determined by evaluating previous research results. Technical analysis as a means of forecasting future price movements is investigated and an analysis of past price and volatility movements is presented with the objective of identifying price and volatility trends.

- **Part 4.** The final part of the research study encompasses the research design. The proposed price risk management methodology is presented in detail and applied to a series of historical and random data sets. The returns achieved through the application of the methodology are compared to those of a pre-determined market benchmark after which the feasibility of the methodology is determined.

1.6 CHAPTER LAYOUT

The ensuing chapters can be summarised as follows:

Chapter 2: The futures market
An extensive literature review is presented on the theoretical background of soft commodity futures markets. The chapter defines the alternative derivative instruments available to market stakeholders as well as their inherent margining system. The relevant option pricing models are discussed and the variables determining the price movement of corn futures prices are identified.

Chapter 3: Volatility of corn futures prices
The concept of 'price volatility' is defined and the alternative methods of estimating volatility levels are discussed. The actual magnitude of corn price volatility is presented as well as the reasons underlying increased volatility levels.

Chapter 4: Price risk management performance of market participants
The extent to which price volatility is transmitted to stakeholders in the corn futures market is investigated. Focus is placed on determining the ability of market participants to mitigate the risk of adverse price movements through derivative strategies, while reasons are provided for the lack of price risk management success.

Chapter 5: The efficient market hypothesis
Definitions for the efficient market hypothesis are presented and the three forms of market efficiency are discussed. The theoretical justification for the existence of the hypothesis is investigated and previous research on the acceptance/rejection of the hypothesis is evaluated.

Chapter 6: Technical analysis as price forecaster

The concept of ‘technical analysis’ is defined and its differences to fundamental analysis are emphasised. The ability of technical oscillators to predict future price movement accurately is determined, and oscillators are applied to historical price data individually, as well as in conjunction with each other. This is done in order to confirm oscillators as being leading indicators. The possible shortcomings of technical analysis are discussed.

Chapter 7: Price and volatility trends

A definition is provided which describes trends as observed in futures markets, and the alternative categorisation of trends based on time frames is discussed. Focus is placed on previous research, which accepts or rejects the feasibility of market trends after which observable price and volatility trends in the corn futures market are identified.

Chapter 8: Research design and methodology

This chapter provides a strong theoretical background on the business research process as well as the alternative research designs available to the researcher. It evaluates the most appropriate sampling method and confirms the implementation of a research design that will enhance the accuracy and dependability of the results obtained from the research process. The chapter confirms the statistical results achieved from the application of the appropriate analysis methods and procedures on the data obtained per individual question as presented in the assessment instrument. Conclusions are made on the results achieved and, where applicable, these conclusions are linked to theoretical findings derived in earlier chapters.

Chapter 9: Empirical research findings and performance measurement

The findings from the previous chapters are summarised and the importance of each conclusion in the development of the proposed price risk management methodology is emphasised. The methodology is presented and applied to historical price data as well as a series of random data sets. Benchmarking is defined, and the most appropriate benchmark for performance measurement in corn futures markets is identified. The returns achieved from the application of the methodology are compared to those of the chosen benchmark, after which the ability of the price risk management methodology to contest the notion of the efficient market hypothesis is discussed.

Chapter 10: Summary, conclusions and recommendations

The research study is summarised and conclusions are drawn on the price risk management success of market participants in the corn futures market. The possibility of developing methodologies that can contest the efficient market hypothesis is discussed and relevant recommendations as a result of the study are made.

CHAPTER 2
THE FUTURES MARKET

2.1 INTRODUCTION

Futures trading in a wide variety of underlying assets have been in existence for a number of centuries. In recent years, futures and options contracts have become increasingly important throughout the world of finance and investments. Despite the versatility of the futures market, it is not universally understood and very few people realise the impact of the futures market on their daily existence. It has become essential for all finance professionals to study and analyse the futures market in order to minimise the risk of price volatility on the sustainability and profitability of their businesses.

Even though trading in the futures market is complex and requires specialised knowledge, it does provide the user with greater freedom for business action. The objective of traders in the futures market may not be homogeneous, as hedgers are risk averse and speculators risk-seeking, but the importance of understanding and studying futures trading remains important to both nonetheless.

The objective of this chapter is to provide a background on the development of futures markets and the mechanics underlying futures trading. The variables defining the price movements of the underlying commodity will also be discussed. This is necessary, since the ensuing chapters will continuously refer to key terms defined throughout this chapter.

2.2 HISTORY OF THE FUTURES MARKET

The futures market, as it is known today, has a long history with includes continuous development over a number of centuries. This market is still evolving and becoming ever-increasing popular and notorious with futures exchanges all over the world.

2.2.1 Historical commodity markets

The historical commodity markets evolved around a number of elements and principles still present in modern-day commodity futures trading, most notably the transfer and hedging of financial risk. Formalised trading practices were established in the ancient Greek and Roman markets with the introduction of a central marketplace, fixed trading hours and common barter. Coins, tablets and tokens uncovered by archaeologists, record the trading activities of earlier generations. It is believed that tokens in the shape of animals were sealed in marked containers as a method by which ancient traders committed to the delivery of a specified number of livestock to the holder of the container. The Forum in Rome was initially used as the common marketplace, while the Agora served as commercial market in Athens. Despite the fall of these civilisations, the fundamental trading principle of a fixed marketplace survived (Teweles & Jones 1987; CBOT 1994).

A widespread disruption in the flow of commerce during the Dark Ages resulted in the trading of products through scattered local markets. This proved highly ineffective and was the motivating factor behind the actions of merchants, craftsmen and promoters to re-introduce medieval fairs through the practice of pre-announcing markets to be held at specific dates and venues. The rapid growth and specialisation of these medieval fairs throughout the 12th century brought about an increase in trading between English, Flemish, Spanish and French merchants. During the following two centuries modern cities with improved transportation and communication methods developed and consequently the importance of medieval fairs declined. Specialised market places, also known as bourses, replaced the fairs in Europe, Japan and the United States during the 14th century (CBOT 1994).

In the United States, commodity markets came into existence in 1752, trading domestic produce, textiles, hides, lumber and metals. A feature of the early US commodity markets was the fact that most of the trade was based upon transactions for immediate delivery (CBOT 1994).

2.2.2 Modern US futures markets

The history of modern US futures trading began on the Midwestern frontier at the start of the 19th century. Subsistence farmers were unable to trade their surplus produce, mainly because they lacked access to large markets as well as the incentives and the myriad of

technologies necessary to practice commercial agriculture. These producers could not ship their grains profitably in bulk to markets and had to be content with converting grains into flour, whiskies or malt which could be shipped south (Clark 1966). Although shipment via the Great Lakes was the natural water route solution for grain shipments east, producers needed local ports to receive their produce. These local interior ports were not operational until the mid-1930s (Clarke 1966). By 1836 more grain was carried by shippers northwards on the Great Lakes through Buffalo than southwards on the Mississippi through New Orleans (Odle 1964).

The development of the Illinois-Michigan Canal in 1848 enabled farmers along the Illinois River to ship produce lower down the river to grain merchants. These merchants would accumulate and ship grains to Chicago. This commercial activity resulted in Chicago exploding from a village consisting of 4 107 residents in 1837 to a dominant grain hub and flourishing economic centre by 1850 (Hieronymus 1977). The increase in the volume of grain shipped amidst the growth of the Lake Michigan commerce brought about a need for greater commodity financing among merchants in order to store (and later ship) the higher volume of grain. In order to secure this financing, merchants had to obtain a price commitment from their buyers in addition to a firm agreement on the volumes to be delivered, which contributed to the development of forward contracts. On 13 March 1851, forward contracting was formally introduced in the USA when 3 000 bushels of corn were agreed to be delivered in June of that year at a price of one cent per bushel below the 13 March 1851 price of corn (Teweles & Jones 1987).

Once the concept of forward contracting of an underlying commodity was well established, traders started selling and reselling forward contracts prior to the actual date of delivery. Since a trader could not offset a forward contract, the existence of a secondary market indicated that speculators were active in the market for forward contracts. During 1865, the Chicago Board of Trade (henceforth referred to as CBOT) started to convert liquid and homogeneous forward contracts into futures contracts consisting of standardised contract specifications. The transformation on the CBOT from forward to futures trading occurred simultaneously with the New York Cotton Exchange adjusting to futures trading (Hieronymus 1977). The most prominent futures exchanges, which developed through the course of the 19th century, included the New York Produce Exchange, the Merchant's Exchange of St. Louis and the Kansas City Board of Trade (Hoffman 1932).

A lack of understanding regarding the objectives of futures trading and a shortage of knowledge on the underlying variables determining futures prices resulted in growing opposition against the trading of futures contracts from producers, the broad community and legislatures. The initial fascination in futures trading was dampened by a belief that this practice was tantamount to gambling and consequently gave rise to various debates, questioning its validity and legitimacy (Irwin 1954; Lurie 1979). The difference between speculation and gambling was ostensibly lost on most American people. In particular, resistance came from the belief that the development of so-called “corners” allowed market prices to be manipulated by controlling a sufficient volume of the commodity available. The long-term impact of corners on futures prices was exaggerated though, and therefore had no permanent influence on consumer welfare (Hieronymus 1977).

Ironically, futures trading in America escaped government regulation until after the First World War and operated exclusively under the principles of self-regulation. This can be attributed to the various detractors aiming to outlaw, instead of to regulate, futures trading. Another factor delaying formal legislation was the strong surge in commodity prices over the 25-year period stretching to 1920. The opposition historically blamed futures markets for low agricultural commodity prices and the ongoing price increases nullified their objectives against futures trading (Hieronymus 1977). Once the war ended, grain trading was characterised by a sudden and sharp drop in prices. Congress enacted the Grain Futures Act in 1922, and this was followed by the Commodity Exchange Act of 1936 with the objective of monitoring and investigating trading activities. An important aspect of this latter Act was the limitation set out on the allowable size of speculators’ positions in the market (Leuthold, Joan & Jean 1989). Although subsequent amendments and variations would follow, detractors of futures trading were satisfied that regulation would prevent any future efforts of price manipulation.

The consequential growth in futures trading was not limited to volumes traded but included the addition of new underlying commodities such as cotton, coffee and cocoa. With passing years, the United States moved further away from an agrarian-based economy, and increased attention was paid to the possibility of expanding futures trading to alternative markets including precious metals and non-storable commodities. New monetary policies, whereby an initial rapid credit expansion was followed by an abrupt tightening in money supply, as well as a change in the world’s financial structures opened

the door for the futures industry to expand its offerings to allow financial institutions the opportunity to manage price risks. As a result, the most successful contract in the futures industry followed, namely futures contracts on financial instruments (CBOT 1994).

2.2.3 International futures markets

The international derivatives market experienced a dramatic surge in growth during the previous decade, which was characterised by an increase in the volume traded (liquidity) and prominence in the marketplace. This can be attributed to the following:

- globalisation and liberalisation of trade worldwide;
- enhanced technology and communication;
- less rigorous control on capital flows; and
- the analysis and development of derivative strategies with the objective of minimising price risk

  (Botha 2005).

A volatile worldwide economic environment characterised by frequent changes in interest rates, constant increases in the amount of government debt and political instability highlight the interdependence of the world's economies. The futures industry in the United States has reacted to the need for internationalization due to its sensitivity to the marketplace and its function as a mechanism by which risk can be managed. United States futures exchanges have linked up with foreign exchanges (Chicago Mercantile Exchange (CME) and Singapore International Monetary Exchange), expanded trading hours and developed contracts with international impact in an attempt to make their markets more accessible to international businesses and investors (CBOT 1994).

The CBOT and the CME developed into the largest futures trading markets in the United States. In Europe, the two most prominent futures exchanges are the London International Financial Futures and Options Exchange, and Eurex. Other futures exchanges of note include the Bolsa de Mercadorias y Futuros in Sao Paulo, the Sydney Futures Exchange and the Tokyo International Financial Futures Exchange (Hull 2002).

The following section will discuss the derivative instruments as traded on the numerous futures exchanges worldwide.

2.3 DERIVATIVE INSTRUMENTS

The relationship between the risk of an enterprise and the expected return associated with the level of risk concerned, stand at the heart of any business endeavour. While the risk of substantial losses may be seen as justification for abnormal returns, modest margins are usually associated with lower risk business strategies. In order to obtain the financial objectives of a business, risks should be analysed and managed in a manner that will allow the exploitation of opportunities while not exposing the business to unpredictable risks within the operating environment (James 2003).

The price risk management instruments developed with the purpose of controlling these risks are referred to as 'derivatives' and include forwards, futures and options. While these tools are meant to support risk management systems and programmes, improper applications may result in unwanted and uncontrollable risks. The importance of derivative instruments in modern-day finance warrants further investigation into this complex financial tool.

2.3.1 Definition of derivative instruments

Hull (2002) defines a derivative as an instrument whose price depends on, or is derived from, the price of another asset. A broader explanation from Bodie, Kane and Marcus (2002:980) states that a derivative is a tool "… providing payoffs that depend on or are contingent on the values of other assets such as commodity prices, bond and stock prices, or market index values". Valsamakis, Vivian and Du Toit (2003) describe derivatives as the most sophisticated of all financial instruments, but also the most risky and very much in vogue.

According to the International Accounting Standards Board (IASB) (2006), all derivative instruments encompass the following three characteristics, namely:

(1) their value fluctuate in accordance with changes in a specified interest rate, commodity price, foreign exchange rate, credit rating or credit index, or other variable;
(2) derivative instruments require an initial investment smaller than required for alternative types of contracts with a similar response to changes in market factors; and

(3) it is settled at a future date.

The value of derivative instruments, as defined above, are based on the price of an underlying asset (Brigham, Daves & Gapenski 1999). These assets include:

- commodities
- currencies
- stocks
- interest rates

Since derivative instruments are available with a number of alternative commodities as underlying asset, it can be applied by traders in numerous commodity markets as a means of mitigating price risk. The application of these financial tools are not confined to a single market participant, but may be traded by stakeholders with contrasting objectives.

2.3.2 Use of derivative instruments

Derivative instruments are used with the expectation that their application will result in an eventual increase in social welfare (Brorsen & Irwin 1996). Trading in derivative instruments has attracted a number of different traders with overlapping objectives. Three broad categories of traders can be identified:

2.3.2.1 Hedgers

Hedgers, or more commonly known as either producers or processors, make use of derivative instruments with the sole objective of protecting price value at current market levels against future price fluctuations (Irwin & Good 2009). Therefore producers will hedge themselves against the possibility that prices may decrease, while processors apply derivative instruments with the aim of protecting profits against price increases.

2.3.2.2 Speculators

Speculators make use of derivative instruments to bet on future price movement with the expectation of obtaining speculative profits. Derivatives are powerful speculative instruments, since they involve leverage. This can be attributed to the parties engaging in speculative transactions being exposed to market movement with little money changing

hands. Consequently, derivatives provide speculators with a high risk-reward ratio (Bodie et al. 2002).

2.3.2.3 Arbitrageurs

Arbitrageurs aim to achieve riskless profits by entering into two or more derivative instruments simultaneously. This is done by exploiting the futures price of an asset once it moves out of line with its cash price (Hull 2002).

Derivatives can be classified into different financial instruments, each of which can be applied individually or as a combination by market participants.

2.3.3 Classification of derivative instruments

In broad terms, derivative instruments can be classified as either futures contracts, forward contracts or options contracts. Even though the form and terminology of futures contracts and forward contracts differ substantially, the fundamental mathematics and economics of these derivative instruments remain the same (Skerrit 2002). This section will aim to define and differentiate between the alternative instruments available to traders in the futures market.

2.3.3.1 Futures contracts

A futures contract is an agreement to buy or sell a specific asset at an agreed-upon price at a certain time in the future (Hull 2002). According to Petzel (1989), a well-functioning futures contract should be general enough in nature to apply to a broad range of buyers and sellers. The most important characteristics differentiating futures contracts from forward contracts are summarised below:

a) Standardisation

A futures contract is a standardised, fungible contract for delivery at a future date. Although standardisation eliminates flexibility of contracting, it provides the benefit of liquidity as many traders focus on the same set of contracts (Bodie et al. 2002). The standard contract specifications also provide clarity to both buyer and seller on the obligations and performance required upon entering into a futures contract. Futures contracts standardise the following non-negotiable elements (Schap & Dan 2003):

- the asset underlying the futures contract;

- contract size (quantity);
- contract quality and method of settlement; and
- the maturity date of contract.

Table 2.1 illustrates the standard contract specifications of one contract of corn as traded on the CBOT.

Table 2.1 CBOT corn futures contract specifications

Contract elements	**Standardised component**
Commodity	Corn
Quantity	5 000 bushels
Quality	C1; best quality of corn
Contract maturities (delivery months)	March, May, July, September, December

Source: Hull (2002)

b) Formal market

Since the variables of futures contracts are standardised and cannot be amended by the stakeholders trading the particular contract, it is traded on a formal exchange. The parties buying/selling futures contracts are bound by the regulations governing the relevant exchange.

c) Delivery dates

Futures contracts traded on exchanges with a soft commodity as underlying asset are quoted with the main delivery month being synchronised according to the physical crop cycle. Corn is harvested in the United States during the first half of December, and the majority of hedging transactions from producers therefore take place in the December month futures contract. Additional maturity months include March, May, July and September (Hull 2002). Soybeans futures contracts are quoted with delivery months similar to those of corn, with the exception being the absence of a December futures contract in favour of a November futures contract. This can be attributed to soybeans being harvested during November.

d) Closure of positions

The overwhelming majority of futures contracts traded are closed out prior to the delivery month and therefore do not result in the delivery/acceptance of the physical commodity. However, the possibility of physical delivery drives the determination of futures prices. In the instance of futures contracts on stock indices, settlement may take place by way of an exchange of cash rather than delivery of the underlying asset (Hull 2002).

e) Settlement of margins

Futures contracts are valued on a daily basis through a process commonly referred to as marking to market, meaning that gains and losses are calculated and offset in variation margin flow. This is done with the purpose of reducing the risk of default from the counterparty (see section 2.5).

As an alternative to futures contracts, forward contracts are available to market participants as a means of hedging price risk. Although the mathematics of futures contracts and forward contracts are highly correlated, some important differences exist between the two groups of instruments.

2.3.3.2 Forward contracts

According to Brigham et al. (1999), forward contracts are agreements where one party agrees to buy a commodity at a specific price on a specific future date and the other party agrees to make the sale. Since the asset underlying the exchange-traded futures contract does not always comply with the location, quality or origin as desired by the businesses concerned, forward contracts are sometimes favoured over futures contracts. The most important characteristics differentiating forward contracts from futures contracts are summarised below.

a) Absence of standardised contract terms

The procurement and sale of agricultural commodities are incredibly diverse with a large number of qualities, delivery locations and grades applicable. In order to allow for specific contract requirements not offered by the standardised terms of futures contracts, businesses may prefer to negotiate exclusive contract specifications directly with a counterparty and therefore not engage into an extensive set of rules and procedures.

b) Informal market

Forward contracts are commonly traded on informal over-the-counter (OTC) markets and are consequently known as OTC-instruments. These instruments are individually negotiated, cash-settled contracts with specific terms reflecting the needs of both parties. The contract terms may be similar to those of formal exchange-traded instruments, but need not necessarily be so (Scott & Wijnen 2003).

c) Delivery date

Futures contracts may have a range of alternative date of delivery. Since contract terms are negotiated individually with every alternative forward contract, a single delivery date is specified, upon which all contractual obligations should be fulfilled (Hull 2002).

d) Cash settlement of positions

According to Madura (2000), the majority of forward contracts are not closed out prior to delivery of the underlying asset, but the contracts are mainly settled at maturity through cash settlement.

e) Absence of continuous margining

A distinctive feature distinguishing forward contracts from futures contracts is the lack of daily margining. Since the contracting parties agree on settlement of cash flows only on the specified delivery date, credit risk is greatly enhanced and therefore parties are required to provide sufficient collateral as guarantee for the fulfilment of the forward contract or any other type of OTC-instrument (Ryan 2002). Table 2.2 reflects a summary of the fundamental differences between forward contracts and futures contracts as discussed.

Table 2.2 Summary of differences between forward contracts and futures contracts

Forward contracts	**Futures contracts**
Innovative, individual contract terms	Standardised contract terms
Traded on informal OTC markets	Traded on formal exchanges
Single specified maturity date	Range of possible delivery dates
Cash settlement closes out positions	Positions closed out before maturity
Cash settlement at maturity	Daily margining

2.3.3.3 Options contracts

An option contract is a financial instrument, which provides the holder with the right, but not the obligation, to enter into a futures contract (IASB 2006). Valsamakis et al. (2003) defines an option contract as a contract which conveys from one party to another the right to buy or sell a specified asset at a specified price on a specified date. The fundamental difference between options contracts and futures/forward contracts is the greater level of flexibility exhibited by options contracts. This can be attributed to the holder of an options contract having the right, and not the obligation, to enter into a futures contract. In other words, the buyer of an options contract need not commit to the eventual purchase of the asset underlying the options contract. Hence, an option contract is a synthetic position in an underlying asset with a built-in insurance policy (Skerrit 2002).

Options are categorised as being either American- or European options. The fundamental difference is the tolerance exhibited by American options, which allows the holder to close out (exercise) the option any time before and up to its maturity date. In contrast to this, European options are only allowed to be exercised on option expiration date (Bodie et al. 2002). Options traded on the CBOT are classified as American options. Two basic types of options contracts exist, namely call options and put options. Since traders can participate in the derivatives market either as a buyer (long position) or as a seller (short position), four different positions in options contracts can be distinguished (see Figure 2.1):

- buyers of call options;
- sellers of call options;
- buyers of put options; and
- sellers of put options.

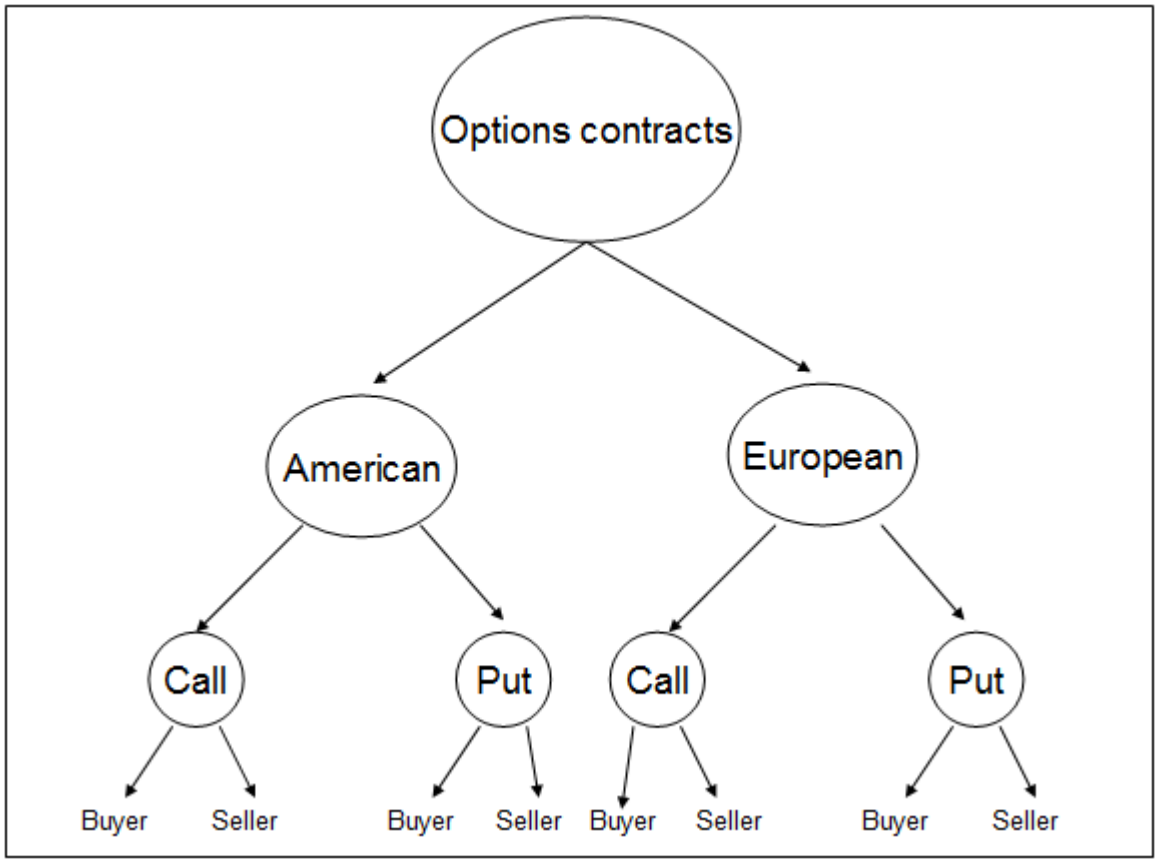

Figure 2.1 Graphical presentation of options contracts classification

Source: Bodie et al. (2002)

a) Call options

"The call option is the right to buy an asset at a specified price at a specified date" (Valsamakis et al. 2003:267). A call option is therefore an option to buy the asset underlying the contract and is generally used by processors aiming to hedge themselves against an increase in prices, or speculators with a bullish market view. The specified price level at which the asset may be acquired is more commonly known as the 'strike price' of the option, while the specified date refers to the maturity (expiration) date of the option contract.

The maximum profit which can be achieved when entering a long call option position can be summarised as follows:

max (St – X, 0)

where X equals the strike price, and St is the price of the underlying asset at option expiry. This indicates that the option will be exercised only if St>X, also known as an option that is 'in the money'. In the instance where St=X ('at the money') or St<X ('out of the money'),

the option will not be exercised since the underlying asset can be bought at a discount to the strike price (Hull 2002). The payoff from a short position in a call option can be summarised as follows:

min (X – St, 0).

These payoffs are depicted graphically in Figure 2.2, which indicates a profit for a long-position holder in a call option on price increases, while the short-position holder simultaneously incurs a loss in a short call option.

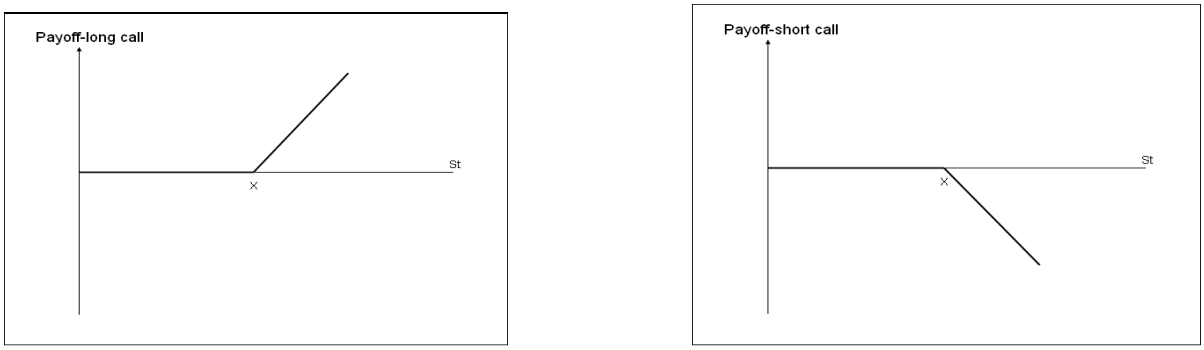

Figure 2.2 Payoff from position in call options

Source: Hull (2002)

The difference in the potential risk and reward when engaging in either a long- or short-position in a call option is summarised in Table 2.3.

Table 2.3 Comparison between long- and short position in call option

	Long position	Short position
Potential risk	Maximum potential loss equals option premium	Unlimited potential losses
Potential reward	Unlimited potential gains	Maximum potential reward equals option premium

b) Put options

"A put option is the right to sell an asset at a specified price at a specified date" (Valsamakis et al. 2003:267). A put option is therefore an option to sell the asset underlying the contract and is generally used by producers aiming to hedge themselves against a decrease in prices, or speculators with a bearish market view.

The maximum profit which can be achieved when entering a long put option position can be summarised as follows:

max (X – St, 0)

where X equals the strike price and St the price of the underlying asset at option expiry. This indicates that the option will be exercised only if X>St, also known as an option that is 'in the money'. In the instance where X=St ('at the money') or X<St ('out of the money'), the option will not be exercised since the underlying asset can be sold at a price level higher than the strike price (Hull 2002). The payoff from a short position in a put option can be summarised as follows:

min (St – X, 0).

These payoffs are depicted graphically in Figure 2.3, which indicates a profit for a long-position holder in a put option on price decreases, while the short-position holder simultaneously incurs a loss in a short put option.

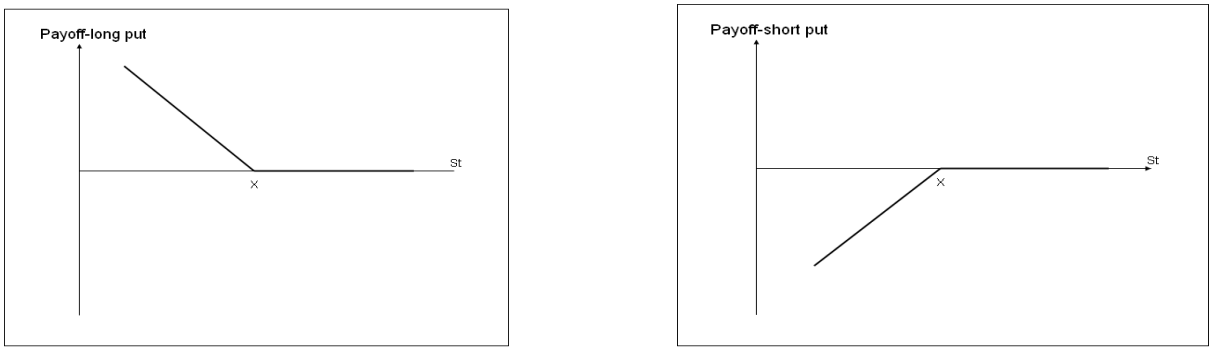

Figure 2.3 Payoff from position in put options

Source: Hull (2002)

The difference in the potential risk and reward when engaging in either a long- or short-position in a put option is summarised in Table 2.4.

Table 2.4 Comparison between long- and short position in put option

	Long position	Short position
Potential risk	Maximum potential loss equals option premium	Unlimited potential losses
Potential reward	Unlimited potential gains	Maximum potential reward equals option premium

From the above discussion, it is apparent that for every position held by a trader in a derivative instrument, another position similar in size but opposite in nature is held by another trader in order to offset the exposure of open positions in the market. The cash flow and margining of the opposing positions will be discussed in the following section.

2.4 MARGINING OF DERIVATIVE INSTRUMENTS

A fundamental difference distinguishing futures- and options contracts from forward contracts is the principle of valuing these instruments on a daily basis through a method known as marking to market. Therefore, a series of random cash flows will be generated over the period for which a derivative instrument is held (Anderson & Danthine 1983). While forward contracts are held until maturity before funds are transferred, profits or losses on futures- and options contracts accrue on a daily basis. As such, the maturity date of the contract does not govern the realisation of profits or losses. The objective of a daily marking to market is to eliminate the possibility of traders not fulfilling their contractual obligations, and is specifically relevant in the derivative market with commodities as the underlying asset, given the high level of price variability.

2.4.1 Magnitude of market movement

Futures prices on corn tend to be volatile with extreme price movements being exposed on an annual basis. The variability in prices and risk of default are the main reasons why traders engage primarily in futures- and options contracts as a hedging and speculative mechanism.

2.4.2 Exchange clearinghouse and margins

A clearinghouse is established by exchanges in order to facilitate the transfer of margins as a result of trades. In other words, a clearinghouse acts as intermediary between traders in the fulfilment of contractual obligations (Bodie et al. 2002). This involves the clearinghouse becoming the de facto seller of the contract for long-position holders and the buyer of the contract for short-position holders. Consequently, the clearinghouse's position is always neutral. The clearinghouse, obliged to perform on each side of the contract, is the only party at financial risk of default since it assumes the contractual position of the opposing parties.

A broker is compelled to be a clearinghouse member, or at least maintain a margin account with a clearinghouse member who in turn maintains a margin account with the exchange clearinghouse. The funds are kept in a margin account against which the net effect of the daily market movement is offset (Hull 2002). Similarly, an investor is required to maintain a margin account with its broking member. These margins act as a safeguard against the possibility of default by a client.

Margins are classified as either initial margins or variation margins. Whereas market movement determines the flow of variation margin, the initial margin is set by the governing body of the exchange on which trading occurs (Hull 2002). In order to clarify the margins, each concept will be discussed in more detail in the ensuing sections.

2.4.2.1 The initial margin

At initial execution of a trade, traders are expected to establish a margin account. A margin account traditionally consists of cash, and it ensures that the relevant parties are able to satisfy the obligations of the derivative contract. This is known as the initial margin of a contract, and is calculated as a percentage of the value of the underlying asset (as determined by the exchange). The initial margin should remain in the margin account of the client as long as an open position is present.

The initial margin payable for one CBOT corn futures contract can be calculated as follows:

IM = %UA x Fp x CS

where IM = initial margin payable

%UA = % payable of the value of the underlying asset

Fp = futures price

CS = contract size in terms of bushels

Currently, the initial margin for CBOT corn futures contracts is roughly calculated as 11% of the value of the underlying commodity. Should prices trade at \$6/bushel, the initial margin of the contract will be calculated as 11% x \$6/bushel x 5 000 bushels = \$3 300/contract.

2.4.2.2 The variation margin

Hull (2002) defines a variation margin as an extra margin required to bring the balance in a margin account up to the initial margin when there is a margin call. The process of marking to market adjusts the value of the funds in the investor's margin account on a daily basis in order to reflect the market movement for the particular day. This is not an arrangement between the broking member and client, but rather a mechanism whereby the investor's losses are paid to the exchange in order to pass on the funds to the investor with a position similar in size but opposite in nature (Hull 2002).

To ensure that the amount of the funds in an investor's margin account never becomes negative, a maintenance margin is set which is somewhat lower than the initial margin. In the event of a decline in the value of the margin account to a level lower than the maintenance margin, a margin call is placed upon the investor to deposit funds to the extent that the original initial margin level is restored. The funds payable to regain this initial margin level are known as the variation margin. Should the variation margin payment not be made, the broking member will liquidate the investor's positions to ensure that further market movement will not result in the net total of the margin account becoming negative (Hull 2002).

2.4.3 Margin flow on forward and futures contracts

Two parties participate in the trading of a forward or futures contract, namely long- and short-position holders (Bodie et al. 2002).

As depicted in Figure 2.4, the long-position holder will realise a profit in the instance where the asset price at maturity is higher than the delivery price of the asset (indicated as "A"). This entails that a long-position holder in a rising market will realise a financial gain. The extent of the profit achieved increases proportionally with the increase in the price of the underlying asset.

In contrast to this, a loss will be realised if the asset price on maturity date is lower than the delivery price of the asset (indicated as "B"). As a result, a long-position holder in a contracting market will suffer financial losses. The extent of the loss increases proportionally with a decrease in the price of the underlying asset.

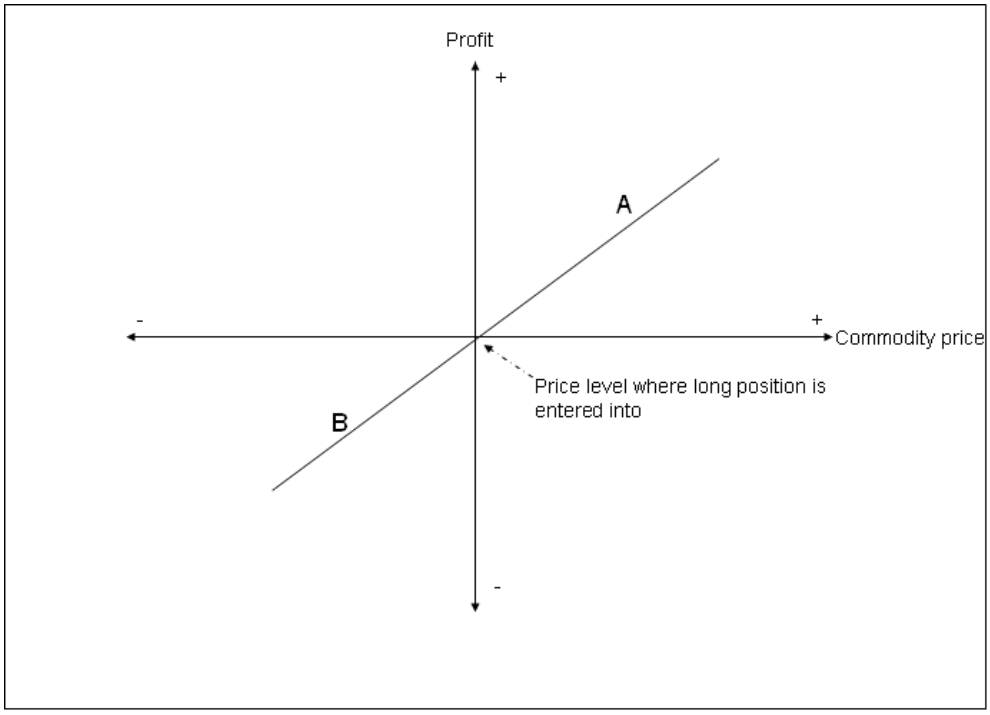

Figure 2.4 Payoff from a long position in a forward contract

Source: Hull (2002)

Figure 2.5 indicates the payoff from a short position in a forward or futures contract. A profit is realised if the asset price on maturity date is lower than the delivery price ("A"). In practice, this means that a short-position holder in a contracting market will realise a financial gain. The extent of the profit achieved increases proportionally with the decrease in the price of the underlying asset.

A short position holder will realise a loss should the asset price on delivery date be higher than the actual delivery price of the asset ("B"). This entails that a short position holder in a rising market will suffer a financial loss. The extent of the loss increases proportionally with the increase in the price of the underlying asset.

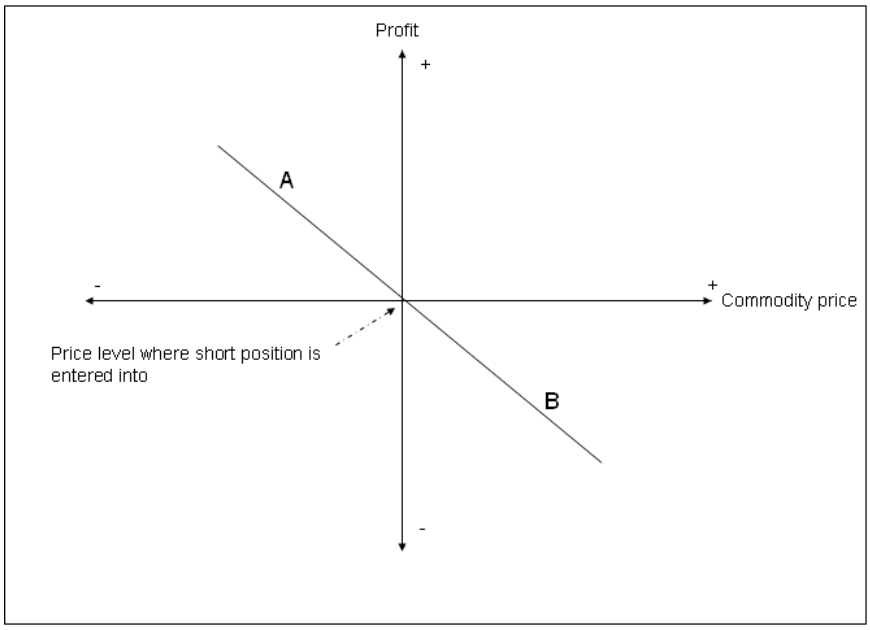

Figure 2.5 Payoff from a short position in a forward contract

Source: Hull (2002)

The ability of traders to hedge themselves against adverse price movements through the application of derivative instruments is particularly useful in the commodity futures markets. This is due to the number of market variables, which can either directly or indirectly influence commodity futures prices.

2.5 COMMODITY TRADING

Futures trading occurs on numerous exchanges worldwide incorporating a wide variety of assets underlying the futures contract. These include equities, currencies and commodities. For the purposes of this study, futures trading with soft commodities as underlying asset were explored.

2.5.1 Commodities in general

Marx (1988) defines a commodity as an external object which, through its qualities or properties, satisfies a human need and is therefore exchangeable. Commodities are consumption assets rather than investment assets (Hull 2002) and cover oil, grains, livestock, meats, fibres and metals (Brigham et al. 1999). Since commodities are a natural substance, they can be owned and transformed by processing and are classified

according to a mechanism of grading according to their inherent quality. In economic terms, a commodity is defined as a portion of wealth which is in demand (Tozer 2003).

According to Marx (1990), a commodity exhibits the following characteristics:

- it possesses an economic value which represents a quantity of human labour;
- it has a use-value since it satisfies human needs, physical or ideal; and
- since a commodity can be traded, it has an exchange value with the price of the commodity being the monetary expression of this value.

Although a wide variety of commodities can be identified, this study focused on price risk management for soft commodities and in particular corn.

2.5.2 Soft commodities

The production of soft commodities is achieved through the manipulation of biological processes and resources such as land and water in combination with technological inputs. In simpler terms, this is known as farming and therefore soft commodities can be categorised as agriculturally produced commodities. The production of soft commodities through agriculture is the most geographically practised economic activity known to humankind. A discontinuous seasonal nature of production, adverse weather conditions and environmental risks remain the biggest constraints in the production of soft commodities. While the development of highly scientific technology underlying the production of soft commodities lowers the risk of crop failures, it remains vulnerable to high levels of uncertainty and shape the way in which commodity markets behave worldwide (Tozer 2003). The pricing behaviour of these soft commodity markets can be managed through the application of derivative instruments. The current study focused on corn as the soft commodity underlying the futures contract.

2.5.3 Corn production in the US

Worldwide approximately 829 million metric tons of corn are produced annually. Of these, about 40% is grown and harvested in the US, with China accounting for 21% of global production. Corn is the single largest agriculturally produced commodity in the US with a total crop value in excess of $66 billion in 2010. The US is not only the world's most prominent producer of corn, but with an annual per capita consumption of 2 074 pounds

per person, it is also the biggest market. Since corn has a number of diverse uses throughout the economy, it makes this agricultural commodity a valuable one to study its price and focus on the impact of price changes on the consumer and all stakeholders active in the trading of corn on the futures market (Finnegan 2011).

In order to clarify the reasons for fluctuating corn prices, each variable with an impact on the futures price of corn will be discussed in more detail in the following section.

2.6 VARIABLES DETERMINING PRICES OF DERIVATIVE INSTRUMENTS

Derivative instruments with corn as the underlying asset fluctuate in value on a daily basis. This can be attributed to a number of market variables having a direct impact on the value of the derivative asset. According to Irwin and Good (2009), compelling evidence exists that the CBOT corn futures contract is entering a new era of exceptional high volatility with increased uncertainty regarding the future price levels of corn futures contracts. This section will focus on the variables determining the price at which futures- and options contracts trade.

2.6.1 Variables determining futures prices

There are primarily three variables which could influence the price of corn futures contracts as traded on the CBOT, namely:

- supply and demand;
- value of local currency; and
- weather conditions.

As a result of the potential influence of these variables on the price of corn futures contracts, it is necessary to discuss these variables in more detail.

2.6.1.1 *Supply and demand*

Commodity price behaviour consists of systematic intra- and inter-year fluctuations, as well as randomness. The variability of prices depends on information flows with supply and demand as backdrop, and therefore is expected to incorporate systematic changes as well

(Tomek & Peterson 2000). Krugel (2003) identifies the supply and demand of corn as the most important consideration in the determination of futures prices.

For a 20-year period from 1989 to 2009 the US became accustomed to an annual corn stocks level of between 10% and 20% of its consumption, otherwise known as the stocks to usage ratio (see Figure 2.6). An explosion in the demand for alternative fuels (see Figure 2.7) resulted in a rapid increase in the production of ethanol from corn and, consequently, the stocks to usage level dropped from levels of 20% in 2005 to 8% in 2011, the lowest ratio in history. Whereas the price of corn was previously determined by its feeding value to livestock (Good et al. 1980), ethanol production currently explains 90% of all corn price fluctuations.

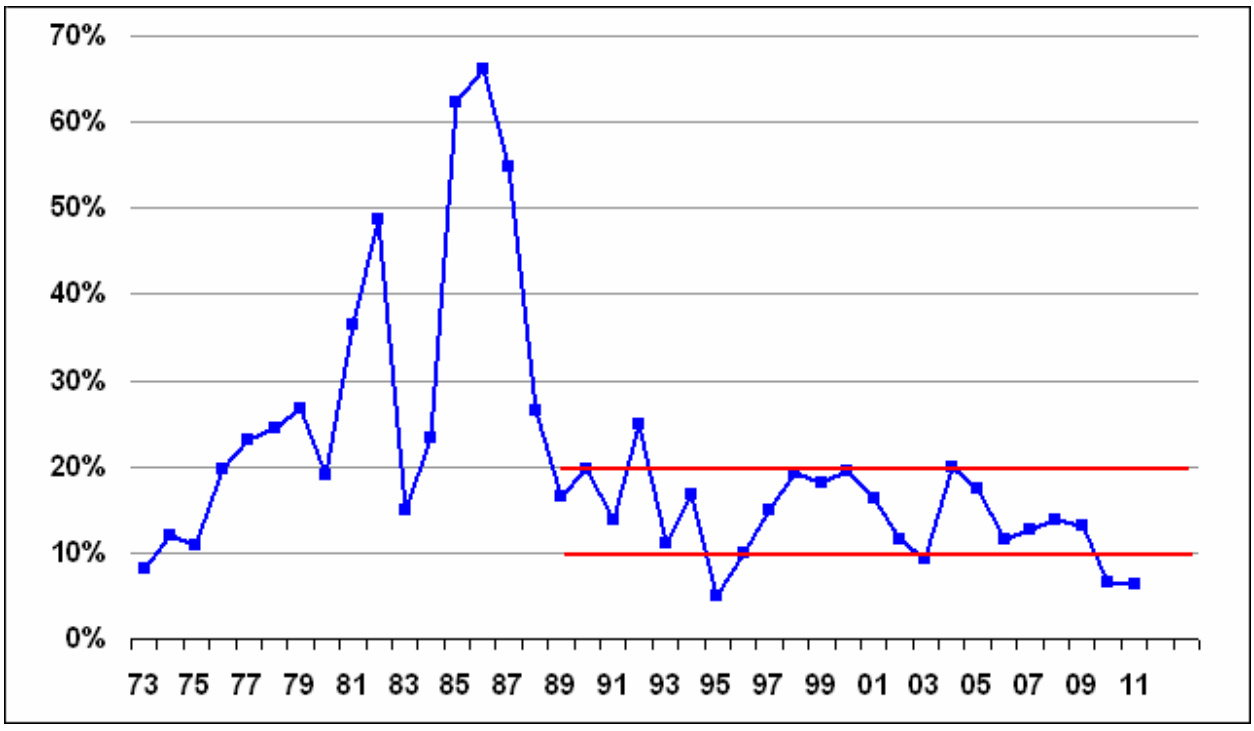

Figure 2.6 US corn stocks to usage ratio 1973–2011

Source: CME Group (2011)

Figure 2.7 Average weekly ethanol fuel production in the US

Source: CME Group (2011)

The continuous decrease in stock levels from 2005 resulted in higher annual corn prices as indicated in Figure 2.8.

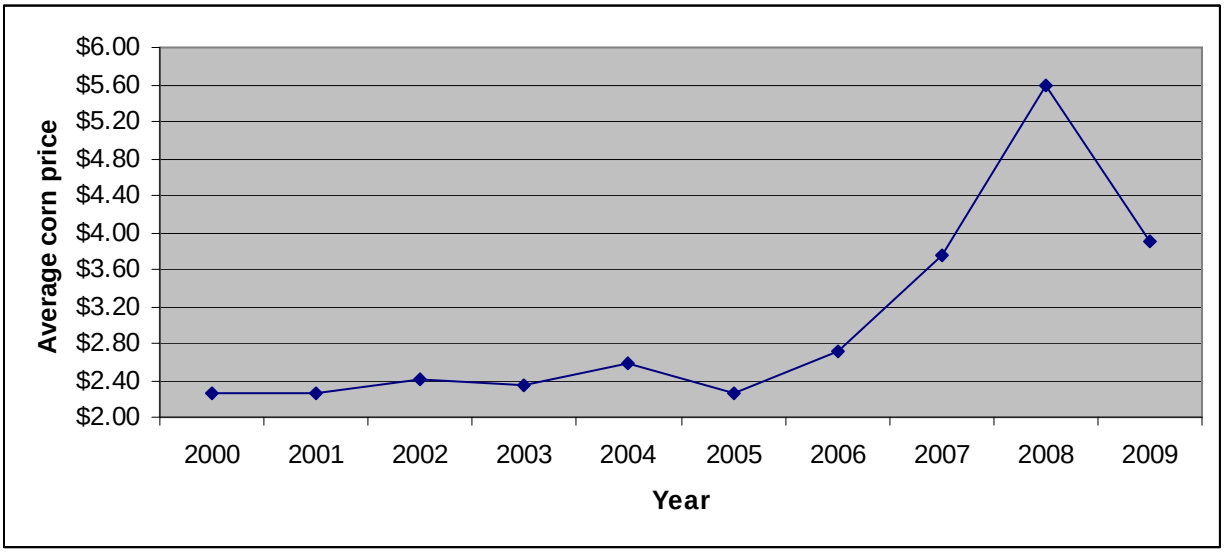

Figure 2.8 Average annual CBOT corn price

Source: CME Group (2011)

The second primary variable affecting corn futures prices is the value of the local currency.

2.6.1.2 *Value of local currency*

Dollar strength indirectly affects supply and demand, and thus the price of corn in the US, through its impact on exports. A weaker dollar allows foreign buyers to procure corn at lower price levels resulting in an increase in exports and therefore lower stock levels. In contrast, a stronger dollar leads to lower export numbers and, consequently, higher stock levels.

This was particularly evident in 2008 when worldwide economic instability resulted in the dramatic appreciation of the US dollar versus foreign currencies. Figure 2.9 confirms the correlation between the value of the dollar and the CBOT corn price. In July 2008, the dollar reached a low of $1.59 versus the euro, but strengthened sharply over the following months to a level of $1.25 in November 2008. Over the same period corn prices retreated from contract highs of $7.13 per bushel to levels of $2.94 per bushel. Therefore, it is evident that the value of the local currency is a major determinant of corn futures prices.

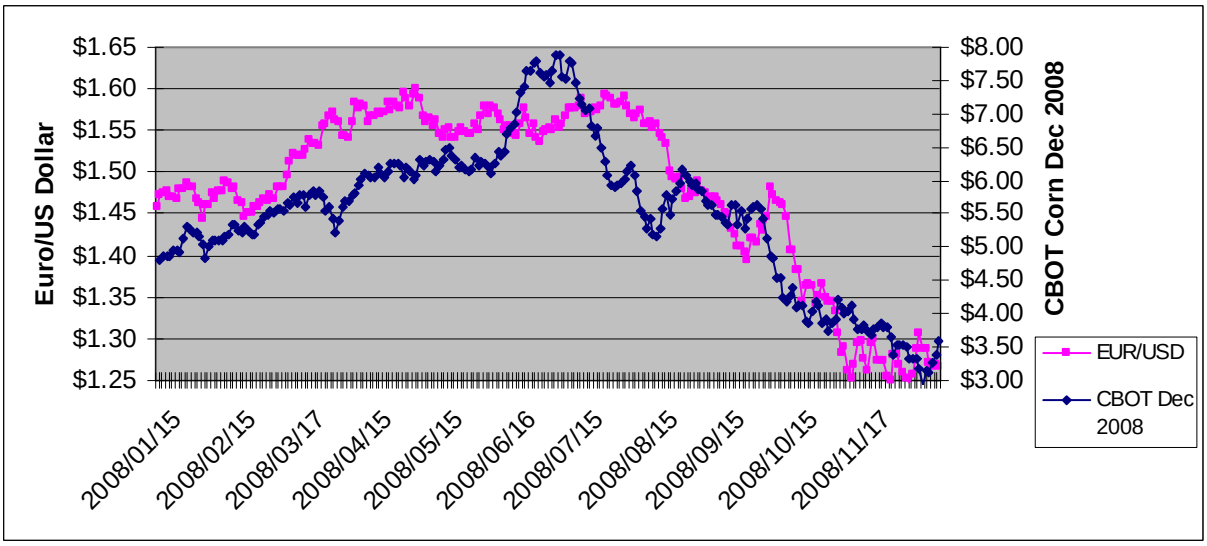

Figure 2.9 Correlation between value of US dollar and CBOT corn prices

Source: CME Group (2011)

The third primary variable affecting corn futures prices is weather conditions.

2.6.1.3 Weather conditions

Weather conditions have an impact on the supply of corn, and therefore influence the ending stocks directly (Chabane 2003). Adverse weather conditions have a negative impact on the size and quality of the crop. This lower supply tends to move futures price

levels higher. Ideal weather conditions, especially during times of planting and pollination, result in a larger crop and higher levels of supply which suppress futures prices.

The US corn crop is planted during the months of April and May, while pollination occurs over the period stretching from the end of June to the middle of August. Since the total corn production is calculated as plantings multiplied by yield, prices tend to be sensitive to adverse weather conditions over these periods. This is illustrated in Figure 2.10, from which the conclusion can be derived that prices tend to be in an upward trend through the start of planting from April up and to pollination in July. Once the size of the crop can be accurately estimated in August (since it is no longer vulnerable to variations caused by weather conditions) prices trend lower. In other words, futures prices flourish during uncertain market conditions.

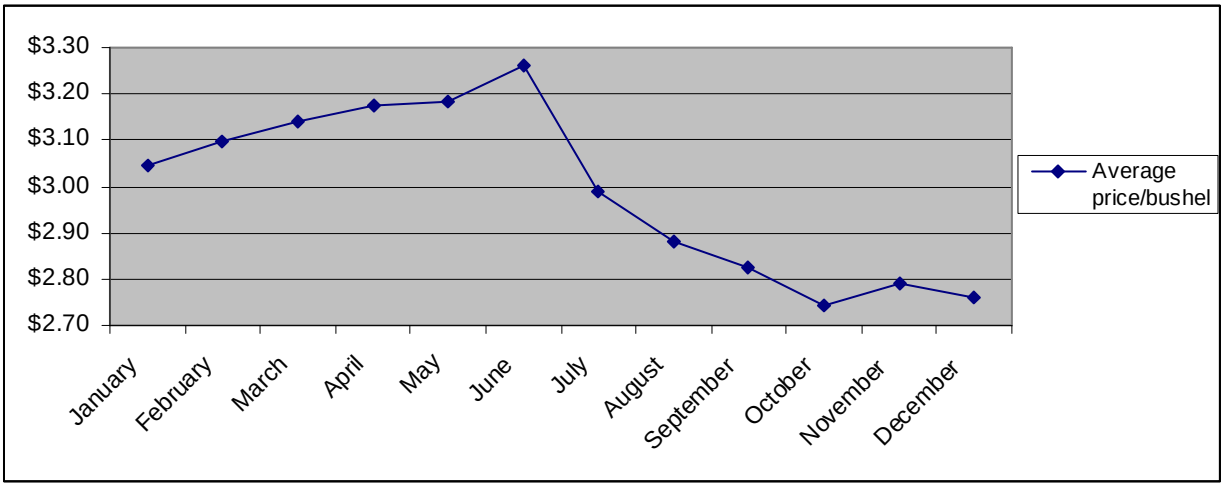

Figure 2.10 Average monthly CBOT corn futures price 2000–2009

Source: CME Group (2011)

While fundamental variables account for the changes in corn futures prices, a number of mathematical variables determine the price of options on futures contracts.

2.6.2 Variables determining options prices

The purchase price of an option is known as the option premium, and can be calculated by various mathematical models. These include binomial models as well as formulas developed by Cox, Ross and Ruberstein (in Botha 2005). The most prominent mathematical model though remains the Black-Scholes option pricing model.

During the latter part of the 1960s, the warrants market, in contrast to the OTC options market, was well developed. According to Skerrit (2002), Fischer Black, Myron Scholes and Robert Merton analysed the market prices of warrants and came to the conclusion that the value of a warrant depended on the total risk of the share, and not on the expected return. They developed a mathematical model, widely known as the Black-Scholes option pricing model, which provides a valuation formula for options contracts. This model assumes that the returns provided by the asset underlying the options contract are normally distributed and asserts that the option premium equals the cost of setting up an appropriate hedge to replicate the expected payoff of the option.

In short, the Black-Scholes option pricing model calculates the present value of the benefit of exercising the option minus the present value of the cost of exercising the option. It can be summarised in the following three equations (Bodie et al. 2002):

$Co = SoN(d1) – Xe^{–rt}N(d2)$

where $d1 = [\ln(So/X) + (r + \sigma^2/2)T] / \sigma\sqrt{T}$

$d2 = d1 – \sigma\sqrt{T}$

and where

- Co = *the current option value*
- So = *the current asset value*
- $N(d)$ = *the probability that, from a standard normal distribution, a random draw will be less than d*
- X = *the strike price or exercise price*
- e = *the base of the natural log function, namely 2.71828*
- r = *the risk-free interest rate*
- T = *the time to option expiration, expressed in annual terms*
- $\ln$ = *the natural logarithm function*
- σ = *the standard deviation of the annualised continuously compounded rate of return of the underlying asset*

Based on the formula above, the following variables affecting the premium of an option can be identified (Bodie et al. 2002):

- the current asset value (So);
- the strike price (exercise price) (X);

- the volatility of the underlying asset;
- the time until option expiration (T);
- the interest rate (r); and
- the dividend rate of the asset (*σ).*

The asset price, strike price, volatility and time until maturity are the variables with the biggest impact on the value of an option. These variables will be discussed in more detail in the paragraphs below in order to clarify their role as options price fixing mechanism.

2.6.2.1 Asset price

Derived from the Black-Scholes model, the value of an option equals the current asset price multiplied by the probability of the asset price finishing higher than the strike price of the option minus the present value of the exercise price multiplied by the probability of the asset price finishing higher than the strike price.

By increasing the asset price in the options pricing formula, a higher option premium is obtained. Conversely, a lower option premium can be derived by decreasing the asset price in the options pricing formula.

2.6.2.2 Strike price

Options can be valued by comparing the strike price of the option against the current price of the underlying asset.

- An option with a strike price at the same level as the current asset price is known as an ‘at-the-money’ option. In other words, the option is entered into at the current futures price level.
- An option with a strike price at a better level for the long-position holder than the current asset price is referred to as an ‘in-the-money’ option. In other words, an ‘in-the-money’ option is “either a call option where the asset price is greater than the strike price or a put option where the asset price is less than the strike price” (Hull 2002:462).
- In contrast to this, an ‘out-of-the-money’ option is an option with a strike price at a worse level for the long-position holder than the current asset price, i.e. a call option

where the price on the underlying asset is lower than the strike price or a put option where the price on the underlying asset is higher than the strike price.

As such, in-the-money options are more expensive than at-the-money options which, in turn, trade for a larger premium than out-of-the-money options. This is summarised in Table 2.5, with S being the asset value and X equal to the strike price of the option.

Table 2.5 Relationship between the asset price and strike price of options

	Call option	**Put option**
At-the-money option	S = X	S = X
In-the-money option	S > X	S < X
Out-of-the-money option	S < X	S > X

Source: Hull (2002)

2.6.2.3 Volatility of the underlying asset

'Volatility' measures the uncertainty of returns on an asset and refers to the extent to which a price can deviate from its mean. It can be defined as the change in the price of a futures contract over a given time period and is used to price options and perform risk management functions including margin calculations and value at risk measurements.

By increasing the volatility in the options pricing formula, a higher option premium is obtained. In contrast to this, a lower level of volatility will result in a lower option premium.

2.6.2.4 Time until maturity

The longer the time until expiration of the option contract is, the bigger the influence on the eventual option price will be. Time value does not decrease in linear style, since the impact of time value on option prices falls sharply in the last few weeks until maturity. This is represented graphically in Figure 2.11. An option with a longer period until expiration (A) is higher in price and decreases more slowly in value than an option with a shorter period until expiration (B). Therefore, market participants will pay a significantly higher option premium for options purchased long before maturity date versus options obtained close to option expiration.

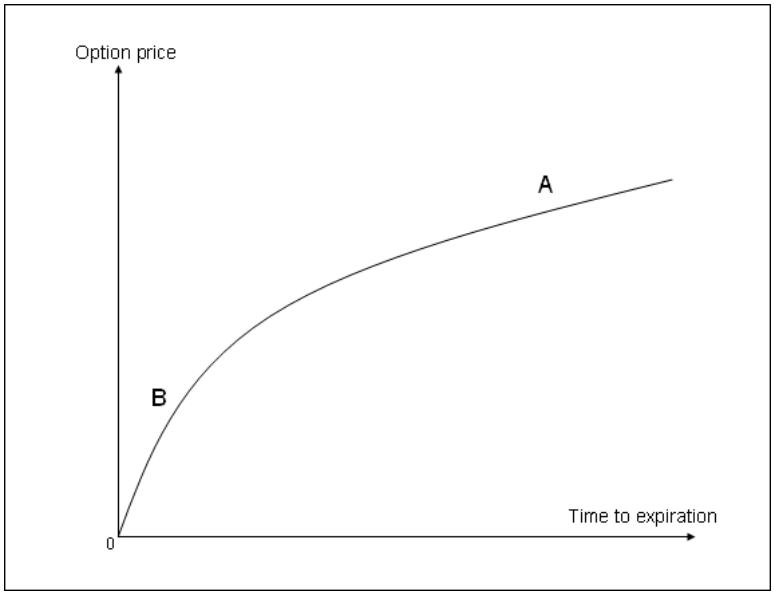

Figure 2.11 Effect of time value on option prices

Source: Hull (2002)

As a number of variables may have a significant impact on the price of an option, traders need to analyse their objectives carefully before entering into a trade. In some instances it will make economic sense to enter into a combination of options in order to decrease the eventual options cost for the strategy implemented.

2.7 SUMMARY AND CONCLUSIONS

Trading in futures contracts has been in existence for centuries, but has become increasingly important in recent years throughout the world of finance and investments. Formalised trading practices developed as early as the ancient Greek and Roman markets, but futures trading in the US only developed by the 1800s as a solution to ongoing transport problems and a lack of access to markets where produce could be sold. The first formal trade in the US occurred on 13 March 1851 when 3 000 bushels of corn were sold to be delivered in June 1851. The CBOT and CME developed into the largest futures exchanges in the US.

Derivatives are instruments whose price depends on the value of the underlying asset. These instruments are traded by hedgers, speculators and arbitrageurs and are classified as being either forward-type contracts or option-type contracts. Futures contracts and

forward contracts are agreements to buy or sell assets at an agreed-upon price at a certain time in the future. Futures contracts are distinguished from forward contracts through a standardised quality, quantity, delivery period and trading location. Options contracts are financial instruments, which provide the holder with the right, but not the obligation, to enter into a futures contract and are classified as call options or put options.

The objective of the margining system is to eliminate the possibility of traders defaulting on their contractual obligations. The initial margin is a cash deposit, which should remain in the margin account as long as open positions are present and is calculated as a percentage of the value of the underlying asset. The variation margin is an additional margin, which is required to bring the balance in the margin account back up to the initial margin whenever there is a margin call.

Commodities are consumption assets, which satisfy human needs and which are exchangeable. Soft commodities are produced through a process, which manipulates biological processes and resources. This is commonly known as agriculturally produced commodities and their prices are derived from exchange traded futures contracts. Corn futures contract prices are determined by a number of variables, the most important of which are the supply and demand of the product. Other variables include weather conditions and currency levels.

The purchase price of an option is known as the premium, and it can be calculated by a number of alternative mathematical models, of which the Black-Scholes model is the best known. The asset price, strike price, volatility and time until maturity have the biggest impact on the option premium.

Chapter 3 discusses price volatility in the CBOT corn futures market. This will be done in order to highlight the magnitude of price movement faced by participants in determining their appropriate trading strategies.

CHAPTER 3
VOLATILITY OF CORN FUTURES PRICES

3.1 INTRODUCTION

Chapter 2 concluded with a discussion on the market variables determining the futures price level at which commodities trade. Although a number of variables can be identified, the supply and demand of the asset underlying the futures contract remains the single most important factor determining prices. The fundamental purpose of a futures market is to enable users to minimise the impact of changing market conditions on price fluctuations, but exaggerated price movement remains a major obstacle in fulfilling this objective.

While futures market participants can discount the direction of market movement through a thorough analysis of the relevant fundamental and technical variables, it is impossible to accurately allow for the magnitude of price movement. Fundamentally, commodity price behaviour over time is a combination of systematic intra- and inter-year fluctuations as well as randomness, but supply and demand shocks can allow for systematic shifts in price patterns and exemplified price movements. This increase in price uncertainty is a major threat to the social welfare of institutions with either a direct or indirect exposure to futures prices.

This chapter will define price volatility and analyse the magnitude of market movement on the CBOT corn futures contract. The reasons for the increase in price volatility will be discussed and evidence will be provided on the theory that corn is entering a new era of exceptional high price volatility. This is necessary since Chapter 4 will focus on the effect of price volatility on market participants.

3.2 DEFINITION OF VOLATILITY

Volatility indicators provide traders with an estimate on the magnitude of price movement that can be expected. A price series or an economic indicator whose value fluctuates a lot is said to be volatile. Hull (2002) defines volatility as a measure of the uncertainty of the price of an asset. Since volatility measures variability or dispersion around a central tendency, it is a simple measure of the degree of price movement. Volatility can be explained as the standard deviation of the percentage change in the asset price over a specified period. In other words, it is the change in the price of a futures contract over a given period. Given that volatility is calculated by means of the standard deviation of the asset price, it will trade within one standard deviation from the mean (average price) two-thirds of the time. Large values of volatility imply returns which fluctuate in a wide range, and therefore increased risk (Kotze 2005). If the day-to-day variation is low, the value of volatility will be low as well.

Volatility is not a transitory phenomenon, but a lasting element of world markets. According to Nivens et al. (2002), price volatility is the least manageable factor threatening market participants. This agrees with an article by Henriques (2008) who argues that the impact of derivative mechanisms on price risk management is minimised by volatility levels which are currently trading well in excess of the average of the last quarter-century.

While some analysts argue that volatility is a result of the random arrival of new information that has an impact on expected asset prices, others believe that price volatility is largely a result of trading itself. Fama (1965) and French (1980) tested the causes of volatility empirically. After collecting the closing prices of assets over a period of time, these two authors calculated the variance of asset prices on successive trading days in addition to the variance of asset prices over trading days interrupted by weekends. The fact that the variance of asset prices over weekends was only between 19% and 22% bigger than those on successive trading days, indicates that volatility is much higher when the exchange is open and therefore it is claimed that volatility is a result of trading itself.

While volatility is an essential tool in the pricing of assets and the risk management of market price movement, the majority of previous research has focused either on equities or on currencies with little reference being made to commodity volatility. This is of particular interest since commodities, and especially corn, differs from equities as the commodity is grown and harvested in a seasonal nature.

3.3 CALCULATING VOLATILITY

Unlike most other market parameters, volatility cannot be directly observed and needs to be estimated. This provides a challenge in itself, as it is not necessarily stochastic and does not conform to any mathematical model. Even though the evolution of volatility remains uncertain, it is crucial to estimate volatility levels accurately for the purpose of risk measurement and management. Market participants make use of alternative methods of volatility estimates based on different objectives. These estimations are based on historical-, implied-, actual- and seasonal volatility.

3.3.1 Historical volatility

Historical volatility provides the user with an indication on how volatile the price of an asset has been in the past. This is of particular interest in the evaluation of trading strategies on historical futures prices. According to Skerrit (2002), historical volatility is analysed with the objective of forecasting future levels of volatility. Modern risk management strategies are concerned with probability distributions of expected future price ranges based on historical data. Should historical volatility be applied in future risk management strategies, it is important to include as many observations as possible in order to ensure statistical significance.

3.3.2 Implied volatility

Implied volatility is often used by professionals and is the view from market participants on where volatility will be in the future. It provides a clear indication on market uncertainty and asset price risk. Kotze (2005:5) defines implied volatility as "… the volatility of the underlying asset price that is implicit in the market price of an option according to a particular model".

The Black-Scholes model is an example of an appropriate mechanism to determine the implied volatility of the price of an asset. By substituting all the appropriate variables in the equation (as discussed in section 2.7.2) with the relevant values, the implied volatility can be calculated.

3.3.3 Actual volatility

Actual volatility is only known at option expiration. As a result, researchers conducting empirical research will only make use of actual volatility in its application after expiry of the option contract.

3.3.4 Seasonal volatility

Anderson (1985) investigated the determinants of futures price volatility through an empirical study. His findings suggested that the dispersion of futures prices in agricultural markets is not constant, but it exhibits changes in price over time in a systematic manner. The corn crop is grown and harvested in the same calendar year, and given the varying stock levels throughout the course of the year it is necessary to examine the impact of seasonality on price volatility.

Commodity prices are traditionally extremely sensitive to circumstances, which may influence the supply of the commodity. This results in inconsistent volatility levels over the specified period and is particularly evident in the corn futures market throughout planting and pollination (Erickson 2005). According to Skerrit (2002), the seasonal volatility trends are not exclusive to commodity markets, but may also be found in financial assets based on certain year-end phenomena.

Figure 3.1 highlights the correlation in the upward trend between corn futures prices and market volatility when approaching planting (April to May) and pollination (July). This can be attributed to weather uncertainties impacting on the acreage to be planted and the expected crop yield.

Total production equals acreage planted multiplied by yield. Good precipitation in the period before planting and up to April will allow for an increase in planted acreage, while drier conditions will result in acreage being lost to commodities with a longer window period for planting. In addition to this, pollination over the month of July plays a significant role in the eventual crop yield. Erratic temperatures and major deviations from the average rainfall for that period may result in lower yields. This uncertainty gives way to an increase in volatility, as the size of the crop cannot be determined accurately. After pollination in

July, the acreage and yield are no longer susceptible to weather conditions and assumptions and projections can be made regarding the expected total production. As uncertainty gives way to actual crop expectations, prices tend to decline along with market volatility.

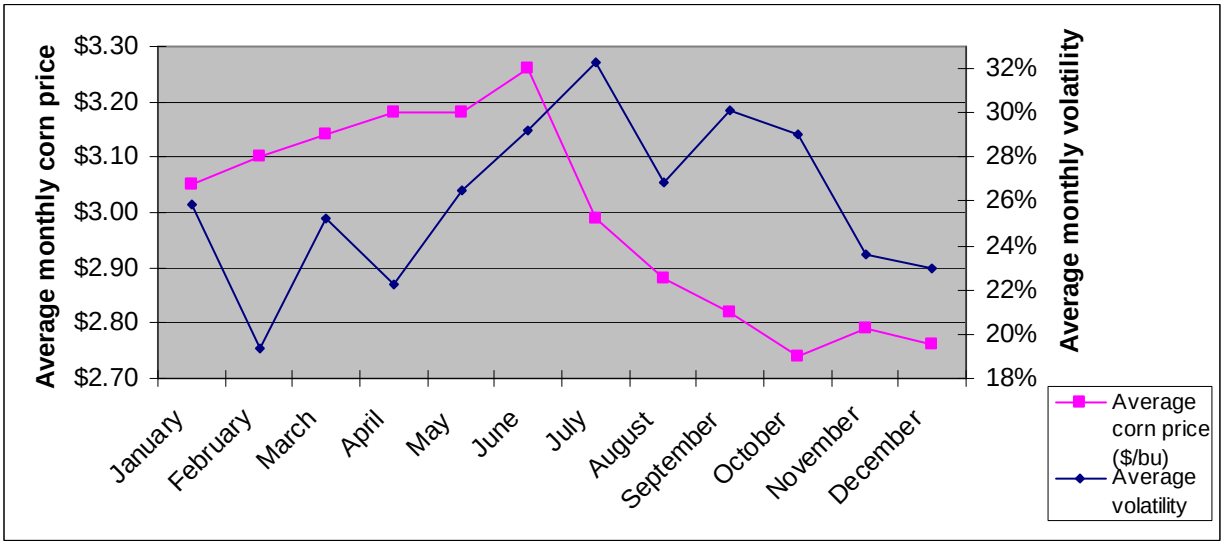

Figure 3.1 Average monthly CBOT corn price vs average monthly volatility

Source: CME Group (2011)

Samuelson (1965) argued that the variance of futures prices tends to increase as the delivery date of the underlying commodity approaches. A limitation of his finding is the fact that the uncertainty structure of the model is summarised in an exogenously given stationary stochastic process for spot prices. This view was partially supported by Rutledge (1976) whose empirical study provided limited support for Samuelson's proposition.

In contrast to the statements suggesting higher volatility levels as the delivery date draws nearer, Goodwin and Schnepf (2000) confirmed the strong presence of seasonality in price volatility. In agricultural markets, volatility was found to peak during the summer months. Seeley (2009) examined the seasonal patterns evident in the volatility of corn futures prices by using high-frequency, intra-day price data to determine the effect of growing seasons on both continuous and discontinuous portions of volatility. He applied a test introduced by Barndorff-Nielsen and Shephard (2004), which compares the realised variance of an asset price against the bipower variation of an asset price. The results indicated that both the realised variance and the bipower variation increase linearly from a

low in February to a peak in July before decreasing towards the delivery date. This is consistent with the conclusion derived from Figure 3.1, where volatility is depicted through the months of February to July. The following section will highlight the substantial increase in price volatility experienced on the CBOT corn futures contract.

3.4 VOLATILITY OF CBOT CORN FUTURES PRICES

'Volatility' is the word which best describes agricultural markets. Agricultural commodity markets are notoriously volatile and over the last few years, these markets have become even more vulnerable to world events as agriculture has become more global in nature. Ray, Richardson, De la Torre Ugarte and Tiller (1998) presented the findings from their large-scale simulation model as motivation for their projections that corn prices may be up to 82% more volatile in the future than over the decade preceding their study. This is of major concern given the already significant price variability inherent in the corn market during the 1990s.

The increase in price volatility subsequently resulted in a heightened interest in the price risk management mechanisms brought about by derivative instruments (Wilson & Dahl 2009). A study by MacDonald, Perry, Ahern, Banker, Chambers, Dimitri, Key, Nelson and Southard (2004) highlighted the staggering correlation between the increased use of derivative instruments as hedging mechanism and market volatility.

Figure 3.2 presents the average annual price volatility from 2000 to 2009. It is evident that the average annual volatility has increased substantially from 2005 until 2008, after which it made a small correction in 2009 due to the majority of the economic shocks of the US recession already being absorbed in commodity prices. According to research, the overall trend in price volatility remains higher though (Irwin & Good 2009).

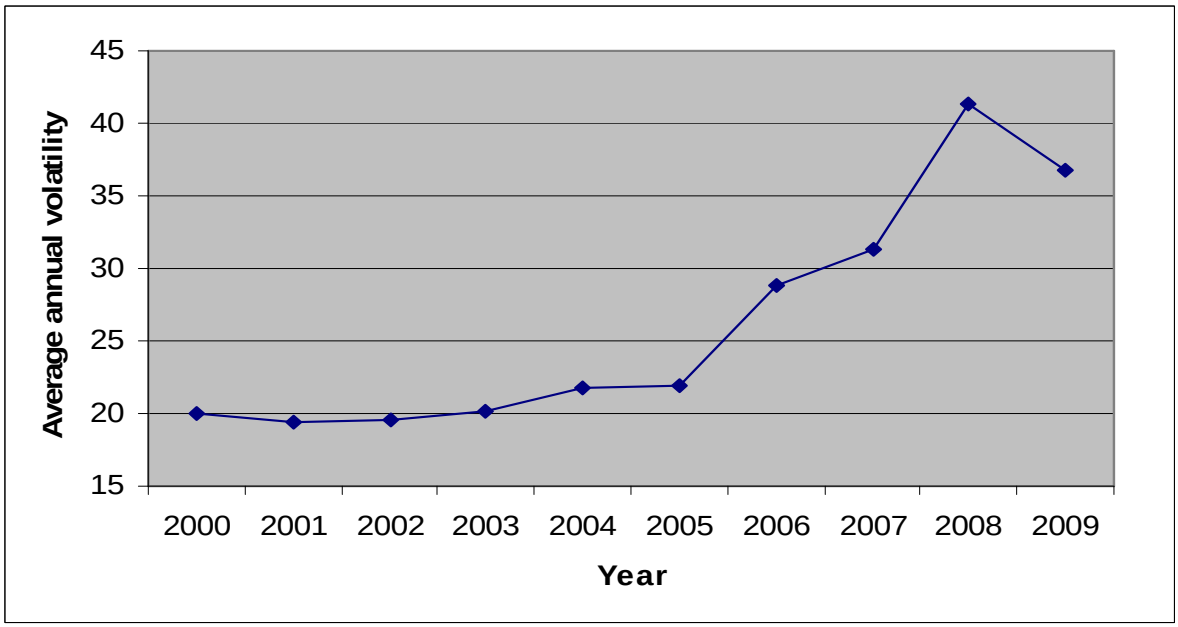

Figure 3.2 Average annual CBOT corn price volatility 2000–2009

Source: CME Group (2011)

In addition to the volatility of corn futures prices, the actual magnitude of price movement is a major concern to all stakeholders in the CBOT corn futures market. Price limits represent the maximum price movement allowed throughout the course of a single trading day. The current price limit for corn futures contracts as traded on the CBOT is $0.30 per bushel per day. Should two or more corn futures contracts within the first five expiration dates trade at limit levels, the limit is expanded to $0.45 per bushel for the following trading day. This level can be expanded even further to a maximum of $0.70 per bushel on day three of a limit movement. Limit movements prevent further trading as the daily limit has been reached and the futures market consequently loses its objective of price discovery.

The increased uncertainty regarding futures prices and an explosion in the magnitude of price movement (see Figure 3.3) has resulted in numerous trading disruptions as a result of limit price movements. From 2000 to 2005, the annual trading range of corn futures contracts stabilised around $1 per bushel, but as a consequence of increased volatility, recent annual market movements have been as high as $5.06 per bushel. This may lead to exchanges adjusting the daily allowable price limit, which in turn will increase the risk of all traders with active positions in the futures market. It has become especially risky to all

market participants over the last few years to have exposure to price movement, as was evident in 2008 when prices increased by 64% over the first six months to an all-time high of $7.88 per bushel, only to fall by 54% over the second half of the year to a level of $3.60 per bushel (see Figure 3.4).

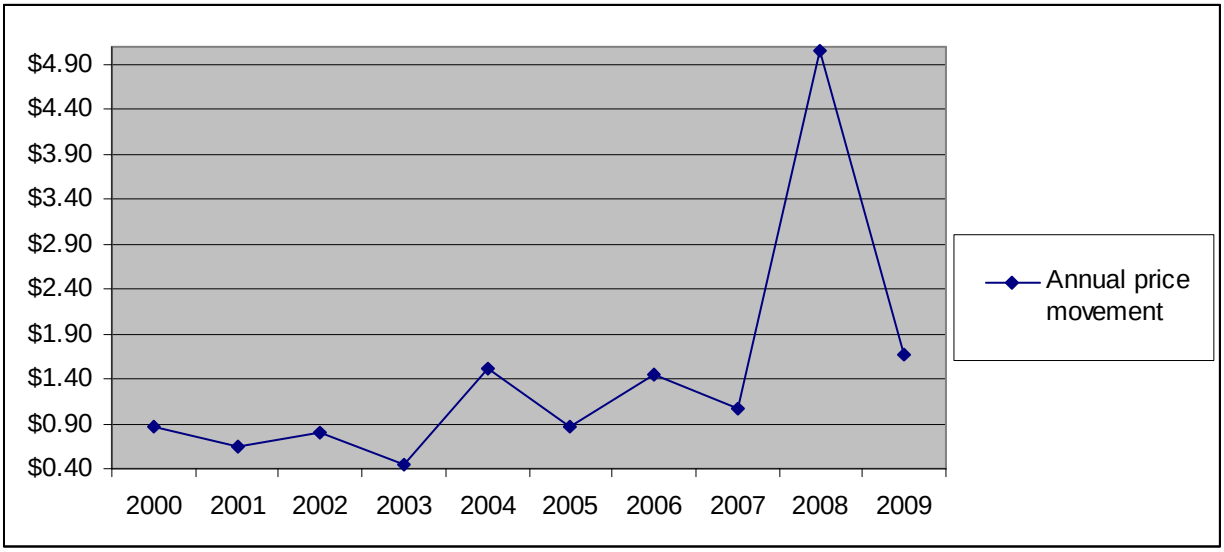

Figure 3.3 Magnitude of annual CBOT corn price movement

Source: CME Group (2011)

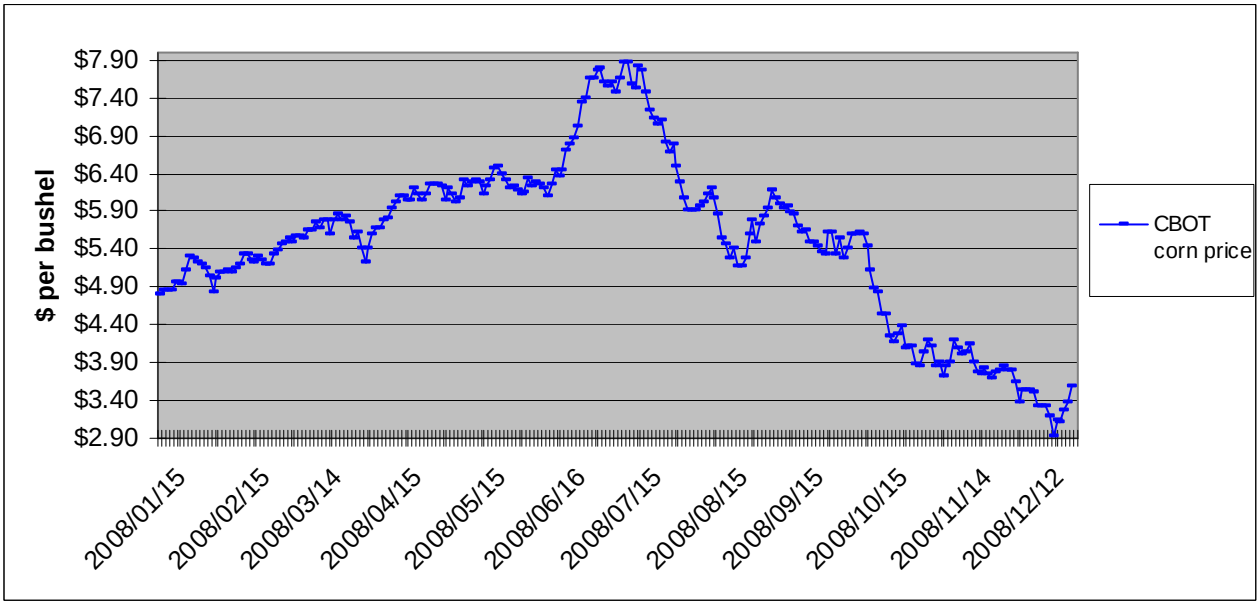

Figure 3.4 CBOT corn futures price 2008

Source: CME Group (2011)

It is evident that price deviations from the mean are increasing at an alarming pace, resulting in higher levels of volatility. It is important to consider the reasons for this disconcerting trend.

3.5 REASONS FOR INCREASED VOLATILITY

It is important to consider the reasons for the exaggerated price movements in the agricultural futures market. Researchers are unanimous about the factors contributing to the heightened volatility levels. These can be summarised as follows:

3.5.1 Supply and demand

Refer to section 2.7.1.1.

Trostle (2008), Irwin and Good (2009), as well as Wilson and Dahl (2009) cite the supply and demand of the commodity underlying the futures contract as the dominant reason behind increased levels of price volatility. This is in correlation with research by Goodwin and Schnepf (1999), which attributes spikes in volatility to lower stock levels as a result of adverse weather conditions.

Sufficient stock levels tend to make prices less sensitive to new market information, and will therefore lead to low levels of volatility coupled with a narrow trading range. In contrast to this, prices are extremely sensitive to new market information during periods of low stock levels. This will result in high volatility with big trading ranges. The US carry-over corn stocks and stocks to usage ratio decreased rapidly from 2005 as ethanol production exploded on the back of government subsidies and laws favouring the production of biofuel as a complementary and alternative method of energy. The lower stocks gave way to a sharp increase in annual price movement and consequently higher levels of volatility. According to Figure 3.5, annual market movement increased from a low of $0.40/bushel to a high of just under $5. In a highly correlated manner, the average annual volatility increased from a low of around 20% to an annual high in excess of 40%.

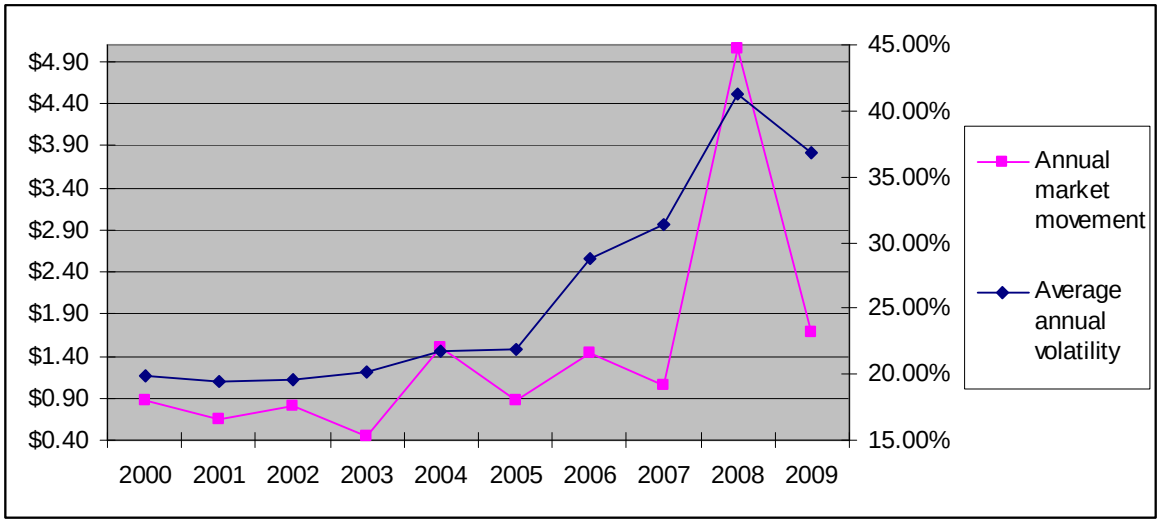

Figure 3.5 Annual market movement vs. average annual volatility

Source: CME Group (2011)

3.5.2 Government policies

Explicit government policy variables, such as acreage constraints and price support programmes, have a surprising positive correlation with price volatility. Mills (2003) cites uncontrollable events such as government policies as a major contributor to price volatility. His view is supported by Wescott (1998) who found that government policies are inherent in all of the supply and demand variables, but manifest themselves most directly in the acreage, export and stocks to usage variables.

This is consistent with the conclusions derived from research by Goodwin and Schnepf (1999) who concluded that federal income support activities such as the deficiency payment variable and loan rate variable destabilised corn prices. Although these activities enhanced and stabilised producer incomes, it resulted in more volatile market prices due to the response from producers to distorted incentives provided by the programs.

3.5.3 Mutual fund trading

Mutual fund trading, also known as speculative trading, has received increasing attention from researchers. In the majority of published research reports, mutual fund trading is

seen as one of the main culprits enhancing an already volatile commodity futures market (Cai, Cheung & Wong 2001; Wilson & Dahl 2009).

An investigation by the United States Senate (2006) into the collapse of a $9-billion commodity hedge fund concluded with the finding that excessive speculative actions from mutual funds result in significant price distortions and increased price volatility. When prices are continuously bid higher or offered lower by funds, the probability that excess returns will continue in subsequent periods decreases along with the length of excess returns. Therefore, the longer the speculative trend continuous, the more likely a reversal will occur.

Emekter, Jirasakuldech and Went (2011) investigated the existence of speculative bubbles in commodity markets, including corn futures contracts. A speculative bubble occurs when investors realise that the commodity traded is overvalued but refrain from liquidating the position in expectation that higher future returns will compensate for the increased risk of the bubble deflating. In their research, McQueen and Thorley (1994) applied their non-parametric duration test. The subsequent empirical findings suggested sufficient evidence of rational bubbles caused by speculation in commodity markets. The eventual correction in the value of the relevant commodity therefore increased volatility.

It is also noted that speculative pressure affects price levels in the long run, and is to blame for price reversals in the short run. Therefore, it can be concluded that speculators and speculative transactions enhance price volatility.

3.5.4 Outside markets

Outside market forces remain one of the biggest contributors to volatility in corn prices. These include equities, credit markets and oil prices.

3.5.4.1 Equities and credit markets

The impact of credit markets on corn price volatility is highlighted by the pressure brought about by the global problems in credit markets since mid-2008 (Irwin & Good 2009). Once it became apparent that an economic recession in the US was inevitable, mutual funds and speculators liquidated their positions, resulting in prices falling from a peak of $7.88/bushel on 26 June 2008 to a low of $2.94/bushel on 5 December 2008.

3.5.4.2 Oil prices

During the mid-1980s the largest category of corn use was animal feed totalling in excess of 104 million tons of corn. In comparison, the industrial use of corn was a miniscule 29 million tons, even less than the volume of direct exports. Over the next 25 years, every category of corn use had double-digit percentage increases. In addition, the industrial use of corn has now overtaken animal feed as the single largest category of corn usage in the US. This phenomenal growth can be attributed to the use of corn as raw material in the fermentation of fuel ethanol, which is blended with regular gasoline (Finnegan 2011.)

Figure 3.6 illustrates the sharp increase in the volume of corn used for the production of ethanol, which is projected to amount to 42% of the total corn production by the end of 2011. This equates to just shy of 150 million tons of corn.

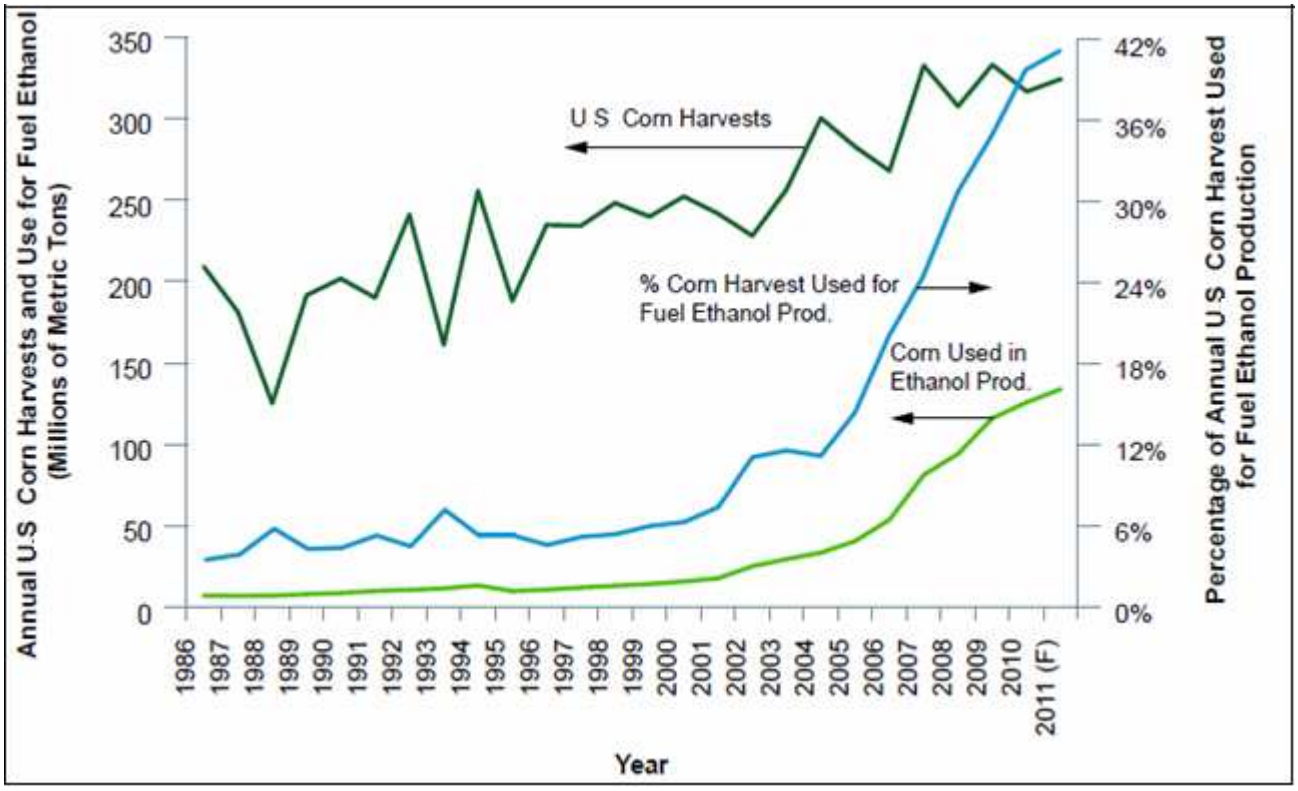

Figure 3.6 Annual US corn production, corn used for ethanol and percentage of production used for ethanol

Source: Finnegan (2011)

Given the astonishing growth in the usage of corn for ethanol fermentation, its value as an agricultural commodity is increasingly being reflected through its value as a blending component for fuel. Therefore, the price of corn is affected by movements in the price of oil. This is illustrated by Figure 3.7, where the close and continuous correlation between the prices of oil and corn can be observed.

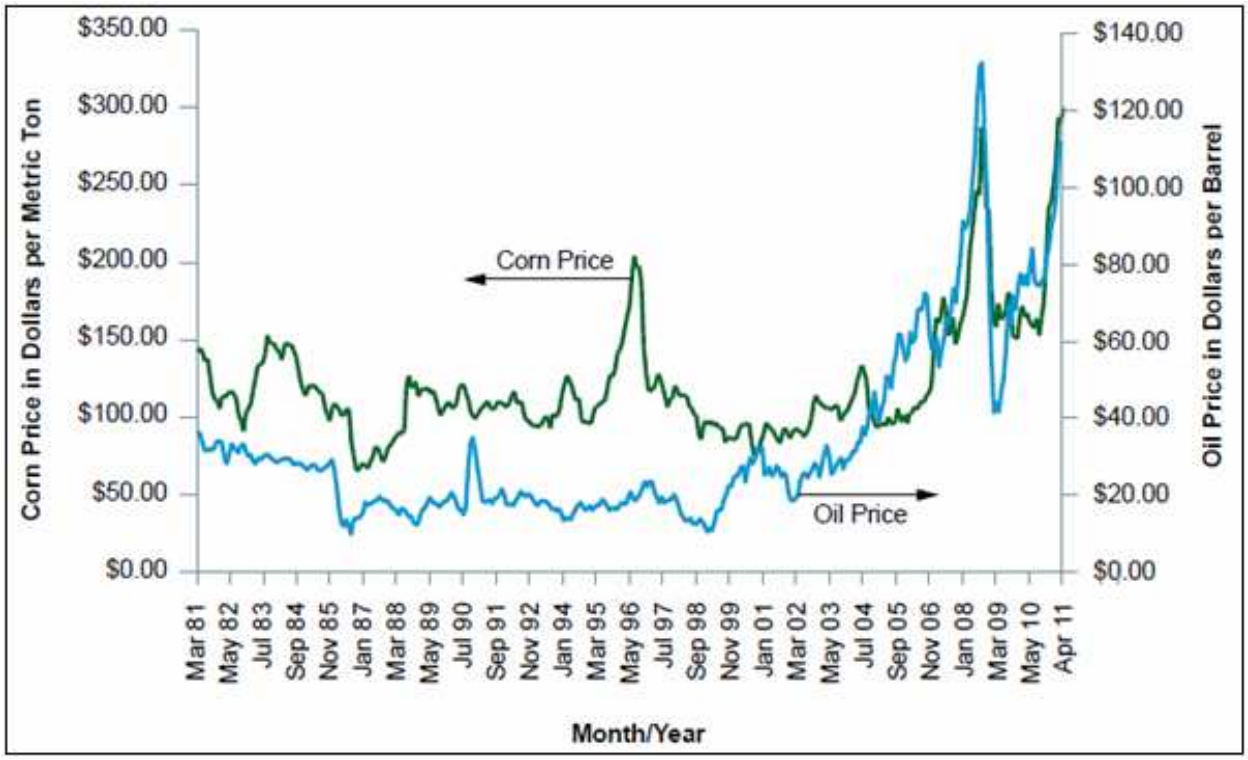

Figure 3.7 Correlation between corn price and oil price

Source: Finnegan (2011)

Given the current unstable worldwide economic conditions, it is important and necessary to determine if the current high levels of price volatility are sustainable and whether volatility can even increase further in the future.

3.6 EXPECTATIONS FROM FUTURE CORN PRICE VOLATILITY

Given the current exorbitant levels of price volatility threatening the effectiveness of risk management strategies applied by market participants on the corn futures market, the following questions arise: Will prices continue to trade on current record-levels and what does that suggest regarding the expected levels of volatility in the future?

According to Irwin and Good (2009), insight regarding the probable magnitude and volatility of future price levels can be obtained by exploring previous market movements. Through an analysis of historical nominal corn, soybean and wheat prices in combination with current market fundamentals, Irwin and Good generated expectations about future price behaviour. This was achieved by identifying comparable periods of structural price change and using this as a template for the current price era.

Figure 3.8 identifies and depicts three periods of structural price change, each of which is thought to have presented a shift in market conditions from the previous period, which resulted in an increase in nominal prices.

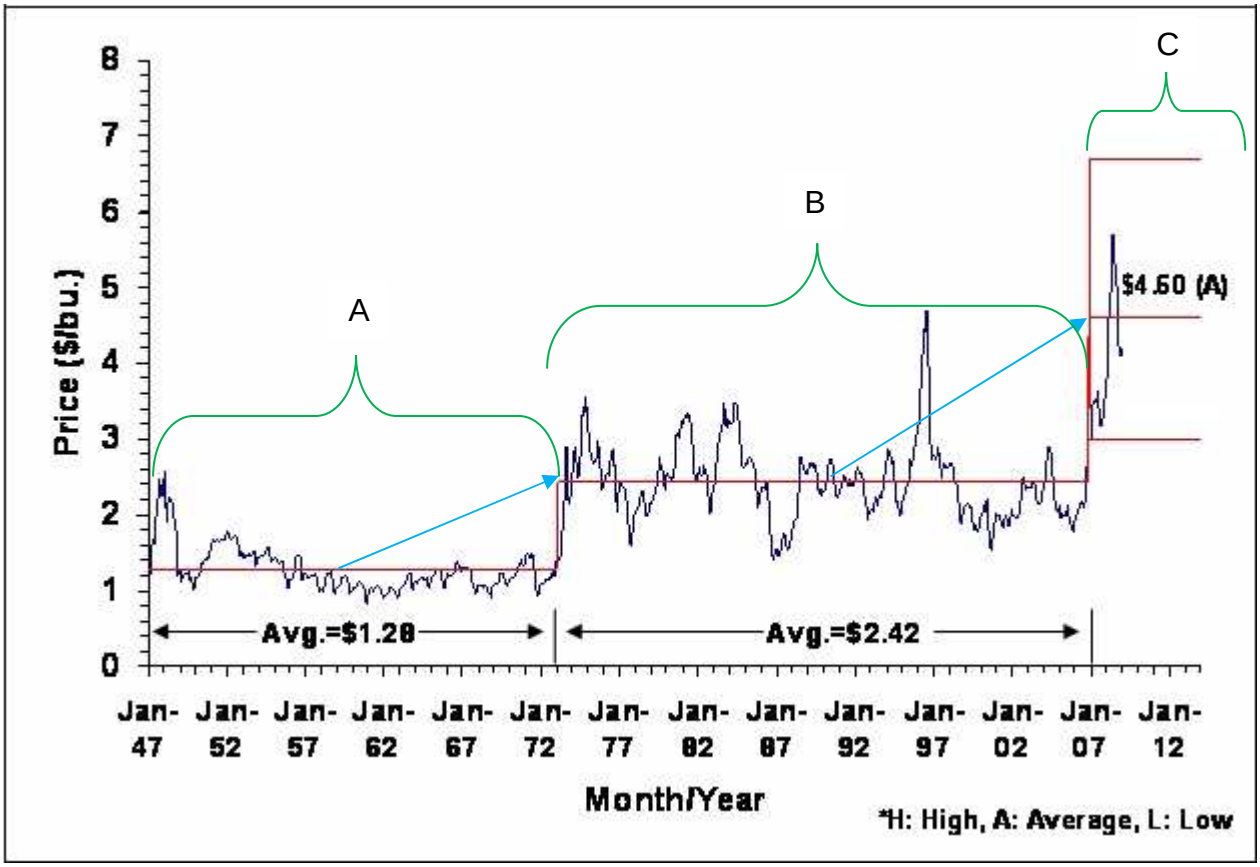

Figure 3.8 Periods of structural changes in corn prices

Source: Irwin & Good (2009)

- January 1947 to December 1972

The first period (A) started after World War II as a result of the suspension of price controls and the start of the post-war rebuilding phase. Nominal corn prices averaged $1.28/bushel

over this period. The structural change in corn prices, which occurred during the early 1970s, resulted in a corn price increase of 89%.

- January 1973 to November 2006

Changes brought about by the amendment in exchange rate policies, an increase in grain purchases from the former Soviet Union as well as escalating energy prices and inflation brought about the second period of structural change (B). Nominal corn prices averaged $2.42/bushel.

- December 2006

It is evident that, as from the end of November 2006, corn prices have moved into a new trading range as introduction to the third structural price change (C). This can be attributed to large volumes of corn used for ethanol production. Should the average price increase of corn futures prices match the 89% observed from the first to the second period, nominal average corn prices over this period were projected at an average of $4.60/bushel. This concurred with the price projections achieved from sophisticated econometric models (Babcock 2008).

Of even greater concern is the volatility associated with transitions from one period to another. The first five years following a structural price change are characterised by increased volatility as participants adjust to new price levels. This magnified volatility is summarised in Table 3.1.

Table 3.1 Nominal monthly corn prices 1947–2006

CBOT Corn ($/bu)	January 1947 to December 1972	January 1973 to November 2006	December 2006
Average price	$1.28	$2.42	$4.60
Highest price over first five years	$2.57	$3.54	$8.00 (projected)
Ratio of highest price vs. average	2.01	1.46	1.74 (projected)
Lowest price over first five years	$0.99	$1.60	$3.30 (projected)
Ratio of lowest price vs. average	0.77	0.66	0.72 (projected)

Source: Irwin & Good (2009)

The average of the percentage price ranges experienced over the first five years following a structural price change applied to an expected nominal corn price of $4.60/bushel over the third period implies an expected trading range in average monthly prices of $3.30/bushel to $8.00/bushel. This may prove to be compelling evidence that a new era of exceptional high corn price volatility had begun, supported by considerable uncertainty regarding the new level of average nominal prices. The prospect of large ranges in annual price movement suggests that market participants could find more value in derivative instruments as a mechanism of protecting profitable price levels, while still being able to capture favourable price movements.

3.7 SUMMARY AND CONCLUSIONS

Volatility is defined as a measure of the uncertainty of the price of an asset and provides traders with an estimate on the magnitude of price movement which can be expected. Price volatility is the least manageable factor threatening market participants and is currently trading well in excess of the average from the last quarter-century. Volatility remains an essential tool in the pricing of assets and the risk management of market price movement.

Volatility cannot be directly observed and needs to be estimated. Market participants make use of alternative methods of volatility estimates based on different objectives. These include historical volatility, implied volatility, actual volatility and seasonal volatility.

Agricultural commodity markets are notoriously volatile and are set to become even more vulnerable to world events as agriculture is becoming more global in nature. The increase in price volatility has resulted in a heightened interest in the price risk management mechanisms brought about by derivative instruments. In addition to the volatility of corn futures prices, the actual magnitude of price movement is a major concern to all stakeholders in the CBOT corn futures market.

Supply and demand of the asset underlying the futures contract, government policies and outside markets are the factors contributing to the heightened levels of price uncertainty. In

addition, an increase in mutual fund trading characterised by speculative transactions is enhancing an already volatile market.

Research has indicated the existence of structural price changes in the corn futures market. By analysing the historical nominal corn prices in combination with current market fundamentals, future price expectations can be generated. A characteristic of structural price changes is the exaggerated levels of volatility, which follows the transition from one period to another. It is expected that a new era of exceptional high corn price volatility has begun, and the prospect of large price ranges suggests that market participants may find more value in derivative instruments as a mechanism of protecting profitable price levels, than relying on hedging in the spot market.

Chapter 4 will identify the stakeholders in the corn futures market. Their respective effectiveness in managing price risk will be evaluated in order to determine the need for an alternative price risk management methodology which can be applied to all market participants.

CHAPTER 4
PERFORMANCE OF MARKET PARTICIPANTS DURING PRICE RISK MANAGEMENT

4.1 INTRODUCTION

Futures markets play a dominant role in the price discovery and risk transfer of agricultural commodities. As discussed in Chapter 3, corn futures contracts experienced a dramatic surge in price volatility over the last decade (2001 – 2011). This resulted in participants in the agricultural soft commodities market having to adapt to a challenging and erratic market highlighted by extreme price movements. Since structural changes in the price levels of corn are expected to enhance the already exaggerated market variability and magnitude of price movement further, increased attention needs to be focused on the success with which market participants are able to protect social welfare.

Volatility complicates price discovery and represents an economic risk to all participants. Agricultural producers and processors make use of futures prices in forming price expectations and production estimates. Therefore, the accuracy and effectiveness with which price discovery occurs has important social welfare consequences for all hedgers in the corn futures market. In addition, soft commodity futures markets have become widespread investment vehicles among asset managers as a form of strategic and tactical asset allocation. The appeal of commodity indices is brought about by their inflation-hedging properties and their role in risk diversification.

The magnitude of price risks can be large and it is therefore clear that risk management is worthy of attention in research. This chapter will explore the effectiveness with which market participants are able to accurately forecast future price movements in order to mitigate the risk of price volatility on their business endeavours. It is necessary to

determine the success of marketing strategies applied by market participants, since this is the foundation on which the proposed risk management methodology will be based.

4.2 VOLATILITY TRANSMISSION TO MARKET PARTICIPANTS

An important consideration regarding price volatility is the extent to which variability in prices is transmitted to stakeholders and relevant markets. This question is justifiable since it may have important policy ramifications. In the instance where volatility has been proved to spill over to market channels, an adjustment in the volatility of primary input markets will have a significant impact on stakeholders and markets through vertical market chains (Buguk, Hudson & Hanson 2003).

The transmission of volatility in financial markets has been the subject of numerous research projects resulting in well-documented literature studies (Byars & Peel 1995; Kim & Rui 1999; Reyes 2001). A common conclusion derived from these studies is that the arbitrage of stock prices and equities across markets should eventually lead to a transmission of volatility between complementary markets. The transmission of volatility in agricultural futures markets has received much less attention though. Given the vertical linkages between market levels and the resultant transmission of prices, it is reasonable to expect that volatility would be transmitted between agricultural market levels as well.

Buguk et al. (2003) examined the possibility that price volatility in agricultural markets may transmit itself through higher market levels and vice versa. They investigated the individual volatility level of each market in order to establish baseline price behaviour. Thereafter, contemporaneous volatilities were used as exogenous variables with the objective of determining volatility spillover. Their study concluded that a unidirectional spillover of price volatility was observed between the primary input prices and vertically related markets.

Given the resultant transmission of corn price volatility, market variability will have a direct impact on all stakeholders trading on the soft commodities futures exchange. The effectiveness by which producers, processors, speculators and market advisory services adjust to market variability will eventually determine the social welfare to be achieved. It is therefore necessary to evaluate the risk management success of these stakeholders.

4.3 PRICE RISK MANAGEMENT EVALUATION

Most businesses with an involvement in corn futures trading experience volatility as a negative market force as it adds an element of danger to the operating environment. Although the element of price risk cannot be ignored, appropriate market exposure can actually allow for significant profit opportunities should the exposure be properly applied and run as part of the business activities. It is important to determine the success with which this element of danger is managed. The effectiveness of producers, processors, market advisory services and speculators in mitigating price volatility will be determined through an extensive literature study.

4.3.1 Producers

Producers are at the start of the chain and are therefore expected to bear the brunt of negative volatility forces since their revenue streams are linked to commodity prices as a whole. Ever since the deregulation and liberalisation of futures markets, producers have been exposed to numerous price variations and uncertainties. Whereas prices used to be determined by subjective government intervention, the liberalised futures market now faces a number of price variables affecting prices on a continuous and irregular manner.

US producers identify commodity price risk as the single biggest challenge they face, notwithstanding the existence of a number of price risk management tools at their disposal (Irwin et al. 2006). This is consistent with the research by Patrick and Ullerich (1996) among Midwestern grain producers, which suggested that price variability is the single highest source of risk faced by crop producers. In addition to the high levels of price risk, which threaten producers, research suggests that price behaviour is the least manageable factor threatening producers (Nivens et al. 2002). Coble et al. (1999) derived their findings from a survey conducted among producers in Indiana, Mississippi, Nebraska and Texas. They found that corn price movement has by far the most potential to affect net farm income. In a national survey conducted by Smith (1989) among US agricultural producers

it was found that 79% of respondents confirmed that price risk management has a considerable impact on the financial success of their operations.

The difficulty faced by producers in effectively managing price risks is of such importance that the World Bank has long recognised this as a factor threatening the continued welfare of producers (Varangis, Larson & Anderson 2002). A general perception exists that producers perform poorly in the managing of corn price risk (Irwin et al. 2006). This view is supported by Decision Commodities (2006) which states that two-thirds of producers on average hedge themselves in the bottom third of the annual price range (Figure 4.1). A survey conducted among farmers at a meeting at the University of Illinois in December 2000 indicated that close to 80% of attendees agreed with this statement from Decision Commodities.

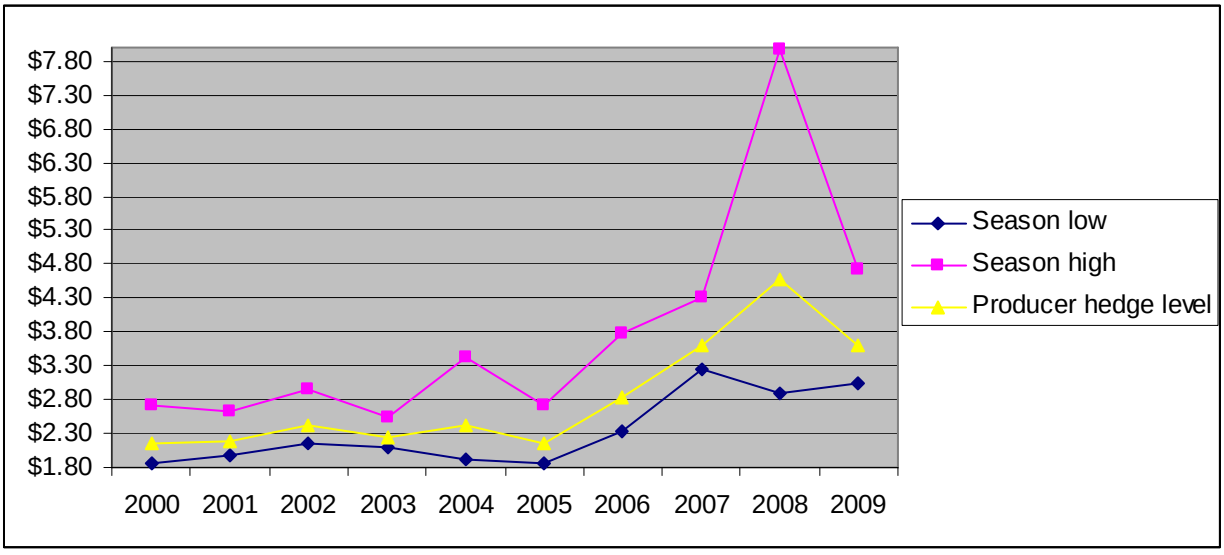

Figure 4.1 Average hedge level of 2/3 of producers

Source: CME Group (2011)

The impact of ineffective hedging strategies or wrong timing of strategy implementation on producers' net income is quite staggering. Even though the CBOT futures price of corn recorded an all-time high during 2008, net farm income reported by Wisconsin producers dropped by $330 million from 2007 to 2008. In a similar trend, the overall US net farm income for 2008 barely matched that of 2007, even though prices more than doubled (Jesse 2009). This indicates that producers' hedging strategies were not able to exploit high prices during the spring and early summer. The subsequent freefall in prices from

July 2008 as a result of the global credit crisis suggests that either few hedging strategies were put in place beforehand or strategies lacked the ability to capture high price levels.

The hedging decision of producers hinges on the expectations of the cash (spot) price of a commodity at a future date when the commodity is being harvested versus the current futures contract price for the specific maturity date (Varangis et al. 2001). As such, a risk-averse hedger will find hedging attractive only in the instance where the futures contract price exceeds the value of the subjective future cash price by an amount sufficient to justify the hedging action itself. A major obstacle faced by producers in hedging grains for future delivery is the fact that the extent of risk reduction from futures contracting can be miniscule when yield variability is high and a negative correlation exists between yield and price (Harwood et al. 1999).

4.3.2 Processors

Corn processors have an intrinsic added value in their businesses achieved by converting the raw product into saleable outputs. Price volatility can have serious financial consequences on corn processors and they therefore need to follow disciplined and rigorous hedging methodologies in order to monitor and control price exposure to the market.

According to Irwin and Good (2009), the most important implication of exaggerated price movement is the timing of entering into a hedging strategy. The recent increase in price volatility had a negative impact on processors, stressing market participants and institutions beyond the breaking point. Since corn used in the production of ethanol and consumed as animal feed amounts to 75% of all US corn usage (Finnegan 2011), it is important to determine the effect of volatile corn prices and extreme market movements on these two business sectors.

4.3.2.1 Effect of price volatility on ethanol industry

Ethanol processors continuously face the difficult task of accurately forecasting future corn price movements in order to hedge themselves against rising input costs. Higher corn prices make ethanol more expensive to produce, and processors therefore need to enter into contracts to protect themselves from lower profitability as a result of an increase in corn prices. The major challenge lies in the timing of entering into a hedge as well as the

most appropriate strategy to be implemented. Unforeseen price movement and ineffective hedging strategies are cited as the main reasons behind the bankruptcy of VeraSun, once one of the largest ethanol manufacturers in the US (Irwin & Good 2009). The firm lost $476 million when hedging by means of fixed price contracts preceded a drop in corn prices (Jesse 2009).

According to Galbraith (2008), VeraSun's bet on the price of corn turned out to be wrong and lead to the eventual bankruptcy of the once profitable company. Although this turned out to be the most publicised of all the ethanol companies facing financial difficulty or bankruptcy based on wrong procurement strategies and price expectations, shares in several other publicly owned ethanol companies slumped dramatically along with decreasing corn prices. Aventine Renewable Energy and Pacific Ethanol both lost more than 80% of their share value over a twelve-month period. In a similar trend, BioFuel Energy lost $46 million when corn hedges turned out badly. As a result, its share price dropped from $7.75 to $0.57 in less than eleven months.

4.3.2.2 Effect of price volatility on feedlots

During the 2008 season, the procurement team of Pilgrim's Pride, the second largest poultry processor in the US, decided on a hedging methodology consisting of exclusively long futures contract positions in order to hedge the company against the expected continuous increase in corn prices. The dramatic collapse in corn prices over the second half of the year resulted in a huge cash outflow to honour margin calls in order to sustain the long futures position on the exchange, and consequently left Pilgrim's Pride with corn contracted at price levels much higher than what could be absorbed in an already contracting poultry industry. This resulted in Pilgrim's Pride filing for bankruptcy (Irwin & Good 2009).

Buguk et al. (2003) analysed the impact of an increase in primary market prices on feed markets. In particular, they were concerned about corn price increases spilling over to the catfish market. As the highest variable input cost for producing catfish is corn, the possibility of higher corn prices are seen as a major threat to the profitability of the catfish market. They concluded with the staggering evidence that volatility in corn prices is directly responsible for the expansion and contraction of catfish markets. Therefore, ineffective hedging strategies will result in lower profitability and contracting catfish markets.

Another example of the adverse impact of price volatility on operating profits in the feed sector is that of Tyson Foods. Due to a lack of timely implementation of hedging strategies, feed had to be procured at higher than expected nominal prices. This resulted in a loss amounting to $91 million (Jesse 2009).

4.3.3 Market advisory services

As is evident in section 4.3.1, producers in general experience price risk management through derivative instruments as an insurmountable obstacle preventing them from obtaining above-average returns on their produce. The majority of producers agree that marketing decisions have a bigger impact on net farm income than production skills (Pope & Hallam 1986). In addition, considerable evidence suggests that producers are shifting the responsibility of price risk management to market advisory services (Patrick, Musser & Eckman 1998). It is estimated that up to 66% of American farmers make use of some sort of advisory service, marketing newsletter or marketing consultant as a means of mitigating increased price volatility (Smith 1989).

A trend of continuous increased spending from producers on market advisory services has developed along with higher volatility levels. These services provide specific pricing recommendations to producers including volumes to be hedged, the method of hedging and the timing of entering into a strategy. As such, the responsibility of pricing shifts from the producer to a third party, and this justifies the investigation into the success by which market advisory services manage price volatility on behalf of short hedgers.

Limited research has been done on the effectiveness of recommendations from advisory services. The earliest study from Marquardt and McGann (1975) into price outlook newsletters suggested that futures prices tend to be a more accurate forecaster of prices than either public or private newsletters. In 1996, Kastens and Schroeder examined returns achieved from implementing strategies recommended by up to ten advisory services over an 8-year period, with mixed results over different commodities. The most comprehensive research project into the risk management success of market advisory services was completed by Irwin et al. (2006) for the AgMAS Research Project at the University of Illinois.

Their project incorporated the marketing recommendations of 23 market advisory programmes for the period 1995 to 2004. The objective of the study was to determine whether marketing services, on average, outperform appropriate benchmarks. In addition to this, they also investigated the persistence in the performance from advisory services over the period evaluated. The study made use of five alternative quantitative indicators of performance, namely:

- the proportion of advisory services in the top- middle- and bottom third of price ranges;
- the proportion of advisory services that outperform the benchmark price;
- the average prices achieved in relation to the benchmark price;
- the risk assumed in trading strategies; and
- the predictability of advisory programme performance on an annual basis.

The study suggests limited and irregular returns in the top-third of the price range similar to results achieved by producers without any assistance in the marketing of their grains. This indicates that market advisory services provide modest results at best. In addition, it is determined that advisory programmes have only a marginal chance of realising returns superior to that of the chosen benchmark. The conditional probability of winner and loser advisory services provide little evidence that future pricing performance can be derived from past performance.

Another interesting research project on the effectiveness of advisory services was done by Martines and Irwin (1994), who focused on the recommended pre-harvest hedge ratios among six private firms. These hedge ratios, typically less than 50%, exhibited substantial individual variation over time, as well as significant variation across advisors. This is in stark contrast to the optimal or minimum variance hedge ratios of 75% to 100% as estimated by agricultural economists.

The discussion clearly indicates that advisory services, either individually or as a group, lack the necessary expertise to outperform the market. Although producers tend to make use of these programmes in order to shift the decision-making responsibility from themselves, research on the effectiveness of market advisory services suggests that the results achieved are not sufficient to justify the costs associated with the programmes.

4.3.4 Speculators

The role of speculation within the economic system has been scrutinised over the years and is still a matter of controversy. Speculators assume the risk of loss in return for the possibility of financial reward. Ordinarily it means that a commodity is purchased for later resale instead of use, or a commodity is sold with the intention of repurchasing it later while hoping for profit to accrue through an intervening price change. Speculators are therefore risk-tolerant individuals who should be rewarded for accepting price risks from more risk-adverse hedgers (Robles, Torero & Von Braun 2009). The question arises whether these risk-seeking individuals are actually rewarded financially for accepting increased levels of risk.

Stewart (1934) is credited for his pioneering research on the profitability of speculators in the soft commodities futures market. In order to determine the ability of speculators to consistently outperform the futures market, he engaged in an analysis of more than 9 000 speculative accounts over a nine-year period. A prerequisite for these trading accounts was that trades had to be limited to exclusively grain futures positions. The results of the study were somewhat concerning, given that close to 75% of all speculative accounts lost money. In addition, the average loss on the accounts analysed amounted to six times the value of the average profit.

A major risk faced by speculators in the corn derivatives market is the formation of speculative bubbles as a result of increased speculative buying by mutual funds. This implies that the actual price of the underlying commodity by far exceeds the fundamental value (Masters & White 2008). The main thrust in the opposition to the formation of speculative bubbles is that large inflows of speculative money allows for significant and unwarranted support for commodity prices. Once the flow of speculative money is reversed by way of liquidation of speculative long positions, the bubble bursts and investors are subject to the risk of forfeiting all accrued profits and, in extreme cases, the starting capital as well (Irwin, Sanders & Merrin 2009).

Research studies on the possibility of achieving positive speculative returns in the long run are unanimous in their conclusions. According to Nivens et al. (2002), attempts by participants in the futures market to exploit price peaks and bottoms will result in

disappointment for these traders. Empirical research by Garcia, Hudson and Waller (1988) confirms the difficulty to achieve abnormal trading profits, with further emphasis being placed on the expected ever-increasing difficulty resulting from increased volatility levels. Although limited evidence exists to support the notion that speculators can outperform market returns, the number who can consistently do so is small. The primary attributes of this limited number of individuals are that they have superior information in comparison to alternative market participants (Nivens et al. 2002).

Wang (2001) conducted a detailed study on the predictability of returns in the futures market. His objective was to determine the ability of large speculators to predict and exploit future commodity price movements successfully. He concluded that large speculators in the futures market are unable to predict the direction and magnitude of price movements accurately.

The evidence discussed and presented in section 4.3 indicates that none of the market participants currently holds an edge over the futures market and that market volatility is to be blamed for the lack of successful hedging and speculative strategies. With market volatility expected to increase continuously in the future, the difficulty of managing and mitigating price risk is expected to grow along with price uncertainty. The question remains why market participants have not been able to adapt to the high levels of price volatility.

4.4 REASONS FOR PRICE RISK MANAGEMENT FAILURES

Unsuccessful attempts to manage and mitigate price risks involved in futures trading are not limited to certain stakeholders in the corn futures market, but are experienced commonly among hedgers, processors, market advisory services and speculators. It has been suggested that, on average, the actual realised price achieved by stakeholders remains far from optimal in a dynamic context and this results in unstable and fluctuating levels of social wealth creation. It does appear as though market participants tend to view the futures market as a manner by which profits can be enhanced, rather than as a means of managing price risk.

Since these market participants are not able to deal with, and in some instances even exploit exaggerated market movement effectively, it is necessary to investigate the underlying reasons for their inabilities. Literature on this topic identifies the various shortcomings from market participants that will be discussed in the sections below.

4.4.1 Limited application of derivative instruments

The majority of hedgers do not make use of derivative instruments to the extent that price risk management can be incorporated successfully within the broader marketing plan. Moreover, those traders who do actually make use of futures and options contracts appear to enter into positions much smaller in magnitude than suggested by estimates of optimal-size hedges (Tomek & Peterson 2000).

Research indicates that most producers have relatively simple marketing methodologies, which include the pricing of physical products in the cash market, with a consequently low percentage of hedges applied through futures and options (Goodwin & Schroeder 1994; Patrick et al. 1998). Goodwin and Schroeder (1994) conducted a survey among Kansas farmers with the objective of determining the extent to which derivative instruments are used in the mitigation of price risk. Their findings suggested that only 10.4% of the chosen sample of producers hedged their crops through the futures market. This limited application of derivative instruments results in producers possessing substantial volumes of grain not hedged upon entering harvesting season, a time prices historically bottoms out.

4.4.2 Capital constraints

According to Goodwin and Kastens (1996), another factor prohibiting market participants from effectively managing prices and increasing social welfare, is the capital constraints brought about by hedging on the futures market. Derivative strategies with the objective of managing price risk and volatility do exist, but these strategies have associated costs. Market participants must be able to finance futures trading operations, including the placement of an initial margin as well as the subsequent variation margins.

With ever-increasing volatility resulting in increased ranges of market movement, the financial tools, which can be applied, are getting more expensive (Henriques 2008). In

addition, the magnitude of volatility in prices influences the amount of capital needed to maintain margin accounts on hedged ownership (Irwin & Good 2009). Unfortunately, the benefits of the mentioned strategies are not universally weighed against the costs since the financial tools are not fully understood for the diversity of circumstances faced by traders in the market (Tomek & Peterson 2000). As a result, profitable trading strategies are forsaken in favour of positive business cash flow. Although the availability of cash flow does have economic value and benefits, it is held at the cost of obtaining superior hedging levels.

4.4.3 Lack of knowledge

The reality remains that rather few hedgers, market advisory services and speculators fully understand and appreciate the opportunities and risks associated with trading on futures exchanges (Varangis et al. 2002). In addition, the majority of the models are so complex in nature that market participants are not able to use it (Anderson & Mapp 1994). The lack of knowledge on the working of the futures market therefore prevents traders from developing and implementing strategies that will mitigate price risk.

4.4.4 Diversification in hedging mechanisms

Prospects for increased price ranges and substantial annual price movement may force market participants to engage more frequently in options contracts as a mechanism of protecting value and enhancing welfare. As a result, the diversification from trading in futures contracts to strategies combining the elements offered by both futures and options contracts is highly recommended (Irwin & Good 2009). By incorporating options into the pricing methodology, producers (and short speculators) will benefit from protecting value through a minimum price with the opportunity to participate in higher market prices. In contrast, processors (and long speculators) will benefit from protecting value through a maximum price with the opportunity to participate in lower market prices.

The benefits of introducing options into the equation include the right obtained by the option holder to exercise the option (Sakong, Hayes & Hallam 1993). Therefore, producers are not obliged to deliver against a long position in a put option and as such production risk is addressed. Similarly, processors are not obliged to purchase stock against a long-position in a call option when lower stock levels are required.

Research suggests that hedgers are more likely to engage in forward pricing and futures contracting than in options strategies (Goodwin & Schroeder 1994; Harwood et al. 1999). Sakong et al. (1993) established that only 19% of hedgers choosing to use financial markets make use of options contracts. As a result, price fluctuations cannot be exploited for the benefit of the user, as the contracted fixed price obtained by a futures contract does not allow for an improved price level as a result of market movement.

4.4.5 Lack of information

Brorsen and Irwin (1996) suggest that market participants, and especially hedgers, are considered to be uninformed traders as they lack access to any special source of information. While such information may be obtained at a cost, the 'noisy rational expectations theory' suggests that the returns to be obtained from such information will equal the consequential cost.

Furthermore, the information usually comes with a lag, which prevents traders from exploiting this information before it is discounted by market prices. Since market participants will in theory therefore always react on the basis of out-dated information, it cannot be expected from them to outperform an efficient and well-functioning futures market without engaging in a comprehensive and detailed fundamental or technical analysis.

4.5 SUMMARY AND CONCLUSIONS

Price volatility represents an economic risk to all stakeholders in the soft commodities futures market. These include producers, processors and market advisory services who make use of derivatives in forming price expectations, as well as asset managers and speculators who invest in commodity futures as a form of strategic and tactical asset allocation. The effectiveness by which price volatility is managed and exploited has a direct impact on the social welfare of stakeholders.

The existence of vertical linkages between market levels in agricultural markets suggests that price transmission, and therefore price volatility, is transmitted to market participants. Limited research confirms the existence of unidirectional spillover of price volatility between primary input prices and vertically related markets.

Producers commonly rate commodity price risk as the least manageable factor threatening the social welfare of their businesses. Processors have experienced dramatic declines in operating profits as a result of unexpected market movement. Market advisory services continually struggle to outperform the market, while speculators are looking for ways to enhance their price-forecasting ability. Ample research confirms that neither of these market participants possesses strategies that will consistently mitigate price volatility, but still exploit favourable market movement.

The main reasons for the inability of traders, including hedgers and speculators, to implement price risk management strategies successfully include a limited application of derivative instruments, capital constraints, a lack of derivative knowledge and delayed market information.

The following chapter will discuss the economic phenomena of efficient markets, otherwise known as the efficient market hypothesis. A detailed investigation will be done on the existence of risk management methodologies, which consistently provide results superior to those of a chosen market benchmark.

CHAPTER 5
THE EFFICIENT MARKET HYPOTHESIS

5.1 INTRODUCTION

Futures prices tend to fluctuate according to the information available for the specific commodity. Chapter 4 investigated the effectiveness by which market participants are able to digest all relevant information in order to forecast future price movements accurately through the application of derivative strategies. This is done with the objective of mitigating the financial risk brought about by price volatility. It was concluded that producers, processors, market advisory services and speculators lack the ability to generate returns superior to those offered by the market consistently.

A supposed characteristic of futures markets is that information is processed rationally. This entails that relevant information is not ignored and that it confirms the absence of systematic errors. Therefore, price levels are theoretically always consistent with current market fundamentals. The financial crisis of 2008 resulted in numerous critics questioning the rationality of futures markets and the extent to which information flows are still absorbed by markets in the realisation and determination of commodity prices. The question remains whether the stock market crash was indeed the result of new information in the market or whether it could be an indication that futures prices are in fact set irrationally.

This chapter will define and discuss the controversial and notorious hypothesis of efficient markets. A detailed literature study will be presented on the existence of empirical studies supporting the validity of efficient markets, as well as studies questioning the hypothesis.

While price deviations from the fundamental value of a commodity may occur from time to time, the chapter will aim to determine whether these deviations are irrelevant or indeed of such economic magnitude that it warrants further investigation.

5.2 DEFINITION

When the hypothesis of efficient markets was first introduced into the economics literature, an efficient market was defined simply as a market characterised by a rapid adjustment to new information (Fama, Fisher, Jensen & Roll 1969). While it is clear that the speed by which market prices adjust to compensate for new information and the magnitude of adjustment relevant to the new information are important elements of an efficient market, it is not limited to this. A more recent definition offered by Fama (1991), states that efficient markets fully reflect all available information.

Jensen (1978) defines the efficient market hypothesis as a description of a market, which is efficient in terms of all of the information available, against which it is impossible to make economic profits by trading on the basis of the relevant information. A simpler definition by Malkiel (1992) states that a capital market is said to be efficient if it fully and correctly reflects all relevant information in determining security prices. In its shortest form, it is a hypothesis that futures prices reflect relevant information (Hull 2002). Since the hypothesis is based on the belief that all information is discounted in current market prices, efficient markets are said to always be in equilibrium and therefore it is impossible for an investor to consistently outperform the market (Brigham et al. 1999).

In the context of this study, Timmermann and Granger (2004) provide the best explanation of the hypothesis. They state that a market is efficient with respect to the relevant information, search technologies and forecasting models if it is impossible to generate economic profits (and increase social welfare) by trading on the basis of certain signals provided by a forecasting model. As such, markets may be deemed inefficient and the hypothesis will be rejected if signals produced by forecasting models result in consistent economic profits. Based upon the variables contained in a specific information set, three forms of market efficiency are generally identified by literature, namely weak form-, semi strong form- and strong form efficient market hypothesis (Fama 1970).

5.2.1. Weak form efficient market hypothesis

Should the information set consist exclusively of past and current asset prices (including possible dividend payouts), the efficient market hypothesis in its weak form is being tested (Timmermann & Granger 2004). Therefore, the weak form hypothesis asserts that the relevant asset price fully reflects all the information which can be obtained by studying market trading data (Bodie et al. 2002).

The weak form version of the hypothesis implies that trend analysis ought to be unsuccessful given that all investors would immediately exploit possible future price signals conveyed by historical data. This entails that excess returns cannot be earned over the long run through the application of investment strategies.

5.2.2 Semi-strong form efficient market hypothesis

The semi-strong version of efficient market hypothesis entails that market prices rapidly discount all publicly available information in an unbiased manner, so that no profits can be accumulated by entering into trades based on the appropriate information (Brigham et al. 1999). Effectively this means that should investors have access to information from public sources, the relevant information has already been reflected in current asset prices. Therefore, neither fundamental analysis nor technical analysis will be able to consistently, accurately and reliably provide excess returns to investors (Bodie et al. 2002).

An important consideration regarding the semi-strong form is that company insiders, who possess information not yet available to the general public, may be able to earn abnormal trading profits. Research by Cornell and Dietrich (1978) suggested that foreign exchange markets may be categorised under the weak- and semi-strong forms of market efficiency.

5.2.3 Strong form efficient market hypothesis

In the instance where all public and private information is included in the information set, market efficiency is tested in its strong form (Timmermann & Granger 2004). Unfortunately, the strong form efficient market hypothesis cannot be tested empirically, as private information is not available for perusal by the general public (Madura 2000). If this version holds firm, even insiders would have a difficult time to earn substantial profits (Brigham et al. 1999).

Research studies on the efficient market hypothesis, which makes use of an extended set of predictor variables (including default premia and business cycle indicators), test for semi-strong efficiency. By restricting the information set in this way, private information is ruled out since such information is hard to measure and quite impossible to obtain. The following section will provide background information on the development and functioning of the efficient market hypothesis.

5.3 DEVELOPMENT AND FUNCTIONING OF EFFICIENT MARKET HYPOTHESIS

According to Jensen (1978), there is no other economic proposition with more solid empirical evidence supporting it than the efficient market hypothesis. While increased attention has been focused on the validity of the efficient market hypothesis since the financial crisis in 2008, it is important to establish the origin of this phenomenon.

5.3.1 Development of the hypothesis

During the 1950s, business cycle theorists traced the evolution of a number of economic variables with the objective of predicting the progress of the economy through periods of peaks and troughs. With the underlying assumption that futures asset prices reflect the expected financial prospects of the asset, recurring price patterns of boom and bust periods ought to reflect themselves in these prices (Bodie et al. 2002).

This proposition was the background against which Kendall (1953) based his studies. He surprisingly found no predictable price patterns, but instead was left with prices fluctuating randomly regardless of past performance. These findings left financial economists disturbed as they were interpreted that futures prices are dominated by erratic market psychology and appeared merely to confirm market irrationality. On further reflection, however, economists eventually started to digest these research conclusions more positively as it became apparent that the random price movements as witnessed by Kendall were actually confirmation of a well-functioning and efficient market.

The study by Kendal (1953) confirmed that forecasts on favourable future performance instead result in favourable current performance as all participants simultaneously enter the market in order to exploit price movement. In other words, any information which can

be used to predict potential future price movements should be reflected in the current asset price already. The efficient market hypothesis is therefore a backbreaker for potential forecasters of futures prices, since it implies that the asset price to be forecasted can in actual fact not be forecasted.

5.3.2 Functioning of the hypothesis

When discussing the functioning of the efficient market hypothesis, it is necessary to investigate the informational efficiency of prices. The hypothesis should yield a number of noteworthy and testable predictions on the behaviour of asset prices and returns. These predictions are discussed in the paragraphs below.

5.3.2.1 Asset prices move as random walks

In an efficient market, asset prices should fluctuate randomly in response to unanticipated and new information that becomes available (Samuelson 1965). According to French (1988), the predictable component of returns accounts for less than 3% of asset return variances. Otherwise known as the random walk theory, the hypothesis merely confirms the absence of arbitrage opportunities to investors (Timmermann & Granger 2004; Malkiel 2005).

While prices may exhibit certain observed trends from time to time, the returns on the asset from the exploitation of the trend will exceed the risk-free asset by an amount commensurate with the risk of entering into the trade. However, even in this instance the deviation of the asset price from the trend will be unpredictable.

A study by Poterba and Summers (1988) provided fragile evidence that the random walk theory may not be as accurate as expected. They confirmed the existence of mean reversion in returns on stock portfolios. This entails that a prolonged period of prices trading at levels below the mean increases the possibility of a period of above average prices.

5.3.2.2 New information is quickly discounted in asset prices

According to Malkiel (2003), the flow of information is unimpeded and immediately reflected in asset prices. Future price changes will reflect exclusively future information and will be independent of current price changes. The unpredictability of future information

will therefore result in unpredictable and random price changes. This indicates that new price information develops randomly, and consequently market prices will adjust accordingly.

Basu (1977) claims that publicly available information is not instantaneously impounded in asset prices but lags and frictions may occur in the adjustment process. His view is supported by Bernstein (1999) who argues that a market which has discounted all information immediately finds itself in a state of equilibrium. According to Basu, equilibrium markets cannot exist as this is only achieved in a static situation. Futures markets are known to be among the most dynamic markets in the world.

5.3.2.3 Spot information cannot predict future returns

Literature suggests that futures markets are still efficient in a scenario where proven price deviations from the fundamental value of the asset do not last too long or occur too frequently before being corrected. Otherwise stated, an efficient market is a market in which price predictability may partially exist, although only locally, in time. Once price predictability through forecasting is discovered by a group of traders, it tends to disappear rapidly through traders' transactions (Malkiel 2003; Timmermann & Granger 2004). According to Graham and Dodd (1965) asset prices are a voting mechanism in the short run, but over longer periods they reflect characteristics of a weighing mechanism. Eventually, price discrepancies are reversed and true value triumphs.

Since the start of the 21st century, economists and statisticians have aimed to prove that price trends actually do occur and that market efficiency is not as dominant a force as it used to be. Beechey, Gruen and Vickery (2000) argues that future price predictability may occur when applying statistical models to spot information, but the extent of predictability is not high enough to provide a basis for the development of a trading strategy capable of generating substantial economic profits.

5.3.2.4 Impact of transaction costs on profitability

Not surprisingly, the subject of efficient markets is not met with enthusiasm by professional portfolio managers as it actually implies that a great deal of their activity is wasted effort. This search for non-existent undervalued assets could therefore be harmful to clients as it costs money and results in imperfectly diversified portfolios (Bodie et al. 2002).

Another factor supporting the validity of the efficient market hypothesis is the presence of transaction costs. Defenders of the hypothesis point to the usually minimal price deviations as irrelevant in terms of economic importance (French 1988). Profitability and predictability needs to be viewed and evaluated in relation to the transaction costs incurred in the implementation of the strategy. As a result, predictable patterns only invalidate the hypothesis if the economic profits are substantial enough to cover the magnitude of transaction costs (Timmermann & Granger 2004).

It is therefore important to distinguish between statistical significance and economic significance. According to Ellis (1998), active investment management ought to be a loser's game, as continuous transactions increase costs and jeopardise performance. This implies that an indexing strategy should provide superior returns over an actively managed strategy in the long run.

Even though the efficient market hypothesis is a controversial proposition, it provides a powerful analytical framework for the understanding of asset prices. If the hypothesis holds true, traders can infer all they need to know about other market participants' information by merely observing prices (Laffont & Maskin 1990). This will be particularly evident in the instance where asset prices are rationally related to economic realities. The conclusions drawn from the informational efficiency and predictive ability from the efficient market hypothesis is summarised in Table 5.1.

Table 5.1 Predictive ability of efficient market hypothesis

Prediction	Empirical evidence
Asset prices move as random walks	* Essentially true * Limited evidence of mean reversion in stock prices * Limited evidence of observable price trends
New information is quickly discounted in asset prices	* New information is usually rapidly incorporated into asset prices * Evidence suggests that lags may occur under certain circumstances
Spot information cannot predict future returns	* Price predictability is not sustainable * Mixed evidence on whether it generates excess returns
Impact of transaction costs on Profitability	* Evidence suggests magnitude of transaction costs nullify potential excess returns

Source: Beechey et al. (2000)

The following section will provide a comprehensive literature review on price forecasting. Arguments against price forecasting will be analysed, while attention will also be focused on literature suggesting to the existence of effective forecasting methods.

5.4 PRICE FORECASTING

Given the complexity and volatility of futures prices, forecasting the direction and magnitude of price movement is a daunting task faced by risk management professionals. The efficient market hypothesis holds that efficient markets cannot be accurately forecasted on a consistent basis over a prolonged period of time.

A vast amount of empirical research has been devoted to developing and analysing financial models with the ability to forecast market movement. Although the majority of the research merely confirms the theory of efficient markets, a number of economists are questioning its validity. This is observed in instances where market prices fail to reflect all of the available information and as such give way to arbitrage or hedging opportunities which will otherwise not exist.

Research on price forecasting has been done mainly for equity markets, with little evidence of price forecasting in the soft commodities futures market. The results of the research programmes are summarised in the next sections.

5.4.1 Studies confirming the efficient market hypothesis

Tomek and Peterson (2000) define futures prices by way of the following model:

$F^t = E [F^x / I^t]$

where ^{t} = *current date*

^{x} = *maturity date*

F = *futures price*

I = *information set*

E = *expectation operator*

The current futures price is therefore the expected value of the maturity price conditional to the information available at time *t*. Tomek and Peterson (2000) state that new information

continuously arrives in the market and this affects the price level immediately since new information is supposed to be discounted without any lags. As a result, the authors conclude that econometric models in the public domain are not able to achieve superior returns since they cannot outperform futures markets as forecasting agents of the maturity price.

According to Timmermann and Granger (2004), the theory of efficient markets is based on the overpowering logic that forecastable returns would induce investors to generate unlimited profits. This, however, cannot occur in a stable economy. Timmermann and Granger (2004) thus argue that the efficient market hypothesis is still valid since price discrepancies from its fundamental value tend to be isolated in time. Once predictable patterns are discovered, they will disappear quickly through investors' transactions. Because of this, individual forecasting models are likely to move through stages of success, followed by a decline in value and ultimately resulting in disappearance. The authors consequently identify the following factors forecasting experiments need to adhere to:

- the set of forecasting models available at any given time;
- search technologies used to select the best model;
- the available real-time information set (including public and private information);
- an economic model for the risk premium reflecting the trade-off between risk and return; and
- the size of transaction costs.

Another research article supporting markets as being efficient was authored by Malkiel (2003). He states that neither technical analysts nor fundamental traders are able to generate returns bigger than what could be achieved by holding a randomly selected portfolio of stocks. Malkiel attacks the existence of predictable patterns as a manner of creating profitable investment opportunities, suggesting that these patterns are not sufficiently robust and dependable in their predictions through different sample periods. In effect, he claims that markets have no memory and past performance is not useful in defining future price levels.

In addition, Malkiel (2003) mentions that statistical dependencies are generally of such a miniscule nature that they will not permit investors to earn excess returns. While a behavioural hypothesis on under-reaction or over-reaction to new information may sound plausible enough when questioning the validity of the efficient market hypothesis, the evidence that such effects occur systematically is often rather thin. Malkiel (2003) concludes by providing empirical research on the investment performance of market professionals, which suggests that investment managers are unable to exploit profitable opportunities consistently.

In a similar vein Tomek (1997) found that forecasts based on quantitative models cannot improve on efficient futures prices as forecasting methods. According to him, empirical models provide even poorer forecasts. This is in agreement with Nivens et al. (2002) who acknowledge the existence of profitable trading opportunities, but claims that empirical evidence prove that it is difficult, if not impossible, to generate abnormal trading profits. In addition, the difficulty of earning trading profits seems to be ever-increasing (Kastens & Schroeder 1996).

Brorsen and Irwin (1996) note that evidence suggesting that markets tend to be efficient and that trading profits are hard to come by is justified by the minimal use of economists' research on price forecasting in the real world. The perception stands that these research findings are of limited relevance in the actual trading environment. If the research objective is to increase social welfare through resource allocation, the research findings need to be applied, but there seems to be general irrelevance in terms of the information on price forecasting and risk management strategies provided by researchers to extension specialists. Brorsen and Irwin (1996) mention that they are aware of only two studies with direct evidence actually favouring price forecasting. This confirms the strong bias toward the rational expectations model (efficient market hypothesis) and provides a strong theoretical challenge to the continued funding of public research on price forecasting and marketing strategies.

The efficient market hypothesis entails that in markets with significant informational asymmetries, equilibrium prices aggregate and discount information effectively. According to Samuelson (1965), asset prices fluctuate randomly in response to the unanticipated

information. Since the unanticipated information cannot be forecasted, price forecasting tends to be unsuccessful.

By investigating the performance of fund managers, the possibility of achieving positive excess returns can be determined. This will imply whether the hypothesis holds true. Earlier studies by Sharpe (1966) and Jensen (1968) reported that managed funds realised returns lower than what could be achieved through a passive buy and hold strategy. More recently, Grinblatt and Titman (1989) investigated the performance of mutual funds and concluded that the returns from these funds barely matched returns from passive strategies. This is consistent with findings by Malkiel (2005), who analysed the results of mutual funds and found the observed research data to indicate clearly that actively managed mutual funds do not outperform comparable benchmark indexes.

Jensen (1978) is adamant in his findings that the efficient market hypothesis has been widely tested and consistently overshadows potential price-forecasting strategies. He states that scattered pieces of evidence, which are inconsistent with the hypothesis, amounts to nothing, since the hypothesis has been found consistent with data on the New York and American stock exchanges, the Australian, English and German stock markets as well as options markets and government bond markets.

5.4.2 Studies questioning the efficient market hypothesis

Research indicates that superior access to information applicable on the underlying asset can result in consistent trading profits (Grossman & Stiglitz 1980). This finding also holds true for traders possessing a superior analytical ability, as found in an empirical study by Zulauf and Irwin (1998). They state that evidence exists which supports the notion that individuals can beat the market, although the number who can consistently do so is small. The primary attributes of these individuals are that they have superior access to information and/or possess superior analytical ability. Wisner et al. (1998) confirms this and identify a number of trading strategies with distinct profit-increasing potential as long as they are recognised ex ante.

According to Pritchett, Patrick, Collins and Rios (2004), the statistical modelling of futures prices can result in mean annual returns considerably higher than the chosen benchmark. Summers (1986) provides evidence that financial markets are not efficient in the sense of

rationally reflecting fundamentals. It is difficult to isolate deviations from efficiency statistically, which makes it unlikely that these deviations will be eliminated by arbitrage or speculative trading. Thompson (1978) applied a relatively simple trading rule on stocks over the period 1940 to 1971, which earned statistically significant abnormal returns of approximately 4% per annum.

This positive view towards price trends and statistical modelling is shared by Lo and MacKinlay (1999) who suggest that short-run serial correlations are not zero and that the presence of continuous successive price moves in the same direction results in the rejection of the hypothesis that prices behave as true random walks. As such, there seems to be a form of momentum in short-run prices. Jegadeesh and Titman (1993) confirm the presence of momentum in financial markets and found that stocks with a high return in the recent past are expected to continue producing above-average returns over a period of up to one year. The phenomenon of momentum can in part be accounted for by the slow adjustment of the market to previous profit surprises.

Consistent with this, Lo, Mamaysky and Wang (2000) indicates that stock price signals as determined by technical analysts may possess a moderate amount of predictive power. It appears as though statistically significant excess returns can be achieved when applying commonly used technical rules to currency trading (Levich & Thomas 1993). Research on the effectiveness of technical analysis in the forecasting of stock price movement indicates marginal levels of success (Brock, Lakonishok & LeBaron 1992). Of concern to the supporters of the efficient market hypothesis is the extent to which this price-forecasting mechanism is used. A marginal role for price forecasting through technical analysis and identification of price trends should be expected, but the fact that over 90% of foreign exchange dealers make use of technical analysis to make projections of up to four weeks in the future remains surprising (Allen &Taylor 1990). It is difficult to explain this universal usage of technical analysis in price forecasting if the market is actually efficient.

5.4.3 Research on efficient market hypothesis in soft commodity markets

Futures contracts with soft commodities as the underlying asset have become widespread investment vehicles for both traditional as well as alternative investment managers. Limited research has been conducted on the efficiency of soft commodities futures

markets and the possibility of developing statistical models which can consistently outperform the market.

5.4.3.1 Studies supporting efficient market hypothesis for soft commodities

Empirical evidence supporting efficient grain futures markets indicates that it is of no use attempting to garner abnormal trading profits in a manner which will reject the theory of efficient markets. This is supported by studies conducted by Garcia et al. (1998) as well as Kastens and Schroeder (1996). According to Tomek (1997), econometric models in the public domain are unable to outperform efficient grain futures markets as forecasting principle.

Zulauf and Irwin (1998) found little empirical evidence supporting supposed price trends in soft commodities futures contracts that will enable the user to achieve above-average returns. This is consistent with the conclusions derived by Zulauf, Larson, Alexander and Irwin (2001) that pre-harvest pricing-generated returns closely correlated with harvest-time cash sales. The isolated cases of positive deviations in returns from pre-harvest sales were judged as modest in percentage terms and statistically insignificant.

According to Kenyon, Jones and McGuirk (1993), prices in corn and soybeans futures contracts followed highly correlated price trends before 1973. These trends could be exploited successfully in forecasting future price movement. Reduced interference of government loan rates and an increase in yield forecast errors resulted in the dramatic decline in forecasting accuracy of price trends after 1973. In addition to the absence of strong price trends, which can be exploited in a manner that will reject the theory of efficient markets, Pritchett et al. (2004) note the considerable cash flow risk associated with pre-harvest strategies due to margin risk and cash outflow associated with the implementation of the strategy.

5.4.3.2 Studies rejecting efficient market hypothesis for soft commodities

Even if grain markets are regarded as generally efficient, strategies involving cash and/or futures markets still possess distinct profit-increasing potential (Wisner et al. 1988). Bessler and Brandt (1992) found an example of such a strategy in the livestock market. Tomek and Gray presented evidence in 1970 of seasonal price patterns in grain futures

markets, which can be applied as a trustworthy source of price-forecasting. To date, agricultural economists have yet to identify a single optimal model for commodity prices.

Szakmary, Shen and Sharma (2010) conducted research on trend-following strategies in commodity futures markets. They found in 22 of the 28 commodity markets investigated that all parameterisations of the dual moving average crossover and channel strategies implemented yielded positive mean excess returns, after compensating for all transaction costs.

Research on commodity futures markets by Fuertes, Miffre and Rallis (2010) regarding the combined role of momentum strategies and term structure signals in the design of profitable trading strategies produced interesting results. Implemented individually, the momentum strategy and term structure signals achieved annualised alphas of 10.14% and 12.66% respectively. When implemented as a double-sort strategy, abnormal profits of 21.02% were achieved.

5.5 SUMMARY AND CONCLUSIONS

The efficient market hypothesis is defined as a market that is efficient with respect to all relevant available information, search technologies and forecasting models. The hypothesis is valid if it is impossible to increase social welfare through economic profits earned by trading on the basis of certain signals as provided by a forecasting methodology. Three forms of market efficiency are identified namely weak form-, semi-strong form- and strong form efficient market hypothesis.

The weak form efficient market hypothesis asserts that the asset price reflects all of the information obtained by studying past and current asset prices. The semi-strong form efficient market hypothesis entails that all publicly available information is discounted in asset prices in an unbiased manner. The strong version of the hypothesis reflects all public and private information. Research studies making use of an extended set of predictor variables test for semi-strong efficiency.

The efficient market hypothesis yields a number of noteworthy predictions. These include asset prices moving as random walks, the rapid discount of information in asset prices, a lack of ability to predict future returns from spot prices and a negative impact as a result of transaction costs on the eventual profitability. A significant number of empirical research studies have been completed on the development and analysis of financial models with the objective of generating returns superior to those offered by the market. Researchers are divided in their conclusions. Limited research has been published on the forecastability of prices in the soft commodities futures market. Although empirical results indicate that grain futures markets tend to be efficient and therefore do not allow for the opportunity to obtain abnormal trading profits, price cycles are observed which may be exploited in a manner that will contrast previous findings on profitability and forecastability in the corn futures market.

The following chapter will discuss technical analysis in financial and commodity markets. A number of technical variables will be defined, analysed and applied to historical data in order to determine whether technical analysts have the ability to forecast future price movements. The correlation between the alternative technical variables will be investigated in order to explore the possibility of combining them to allow for more accurate price forecasts. This is important, as technical indicators will form a substantial part of the eventual proposed price risk management methodology.

CHAPTER 6
TECHNICAL ANALYSIS AS PRICE FORECASTER

6.1 INTRODUCTION

Chapter 5 defined the efficient market hypothesis and investigated the theoretical implications of this hypothesis in terms of the possibility of accurately forecasting futures prices. The literature study conducted suggested that contradictory views exist on the acceptance of efficient markets as economic phenomenon. As a result, no consensus has been reached on the possibility of successfully developing models with the objective of effectively and accurately forecasting price movements. Research in favour of price forecasting regularly identifies technical analysis as an important tool in the development of strategies that can outperform the market.

One of the greatest and most obvious gulfs between academic finance and industry practice is the separation, which exists between technical analysts and their critics from the formal academics. Technical analysis has been part of financial practice for a number of decades. Even though it is growing in popularity and application, it has not received the same level of acceptance and academic scrutiny compared to the more traditional and accepted approaches such as fundamental analysis. One of the main obstacles preventing charting from receiving the necessary respect from academics is its inherently highly subjective nature and characteristics. Critics often argue that the existence of geometric shapes in historical price charts is predominantly in the eye of the beholder.

This chapter will define technical analysis in broad terms as well as the oscillators most appropriate for the development of a risk management methodology. In addition, focus will be placed on the existence of empirical findings supporting or rejecting technical analysis as price-forecasting mechanism. The mathematics behind the relevant oscillators will be discussed and applied on actual market data in order to determine the effectiveness of technical research.

6.2 DEFINITION AND CONTRAST TO FUNDAMENTAL ANALYSIS

It is necessary and important to clearly define and distinguish technical analysis from fundamental analysis, since the proposed risk management methodology will be based on a strong technical foundation.

6.2.1 Definition of technical analysis

Brown and Jennings (1989) define technical analysis as a forecasting method which uses past prices to infer private information. They state that technical analysis has value in a model whereby prices are not fully revealing and traders have rational conjectures regarding the relationship between prices and signals.

This is consistent with the definition by Blume, Easley and O'Hara (1994) who state that technical analysis is a method through which price and volume data are examined with the objective of obtaining information regarding future price movements. A description very much similar to this from Kleinman (2005) suggests that technical analysis encompasses research of past and current price action with the objective of accurately projecting future price action. He states that market technicians believe that the single most important factor necessary for price forecasting is price action.

According to Bodie et al. (2002:374) technical analysis consists of "Research to identify mispriced securities that focus on recurrent and predictable stock price patterns and on proxies for buy or sell pressure in the market."

The most comprehensive definition is provided by Murphy (1999) who defines technical analysis as the study of market action, especially by means of charts, with the primary objective of effectively forecasting future price movements. Market action includes the three principal sources of information which are available to technical traders, namely price, volume and open interest. Murphy's (1999) definition is based on the three premises of technical analysis, namely

1) market action discounts all information;
2) prices move in trends; and
3) history tends to repeat itself.

The next section will differentiate between technical analysis and fundamental analysis as means of anticipating future price movement.

6.2.2 Technical analysis versus fundamental analysis

The most prominent differences between technical analysis and fundamental analysis can be summarised as follows:

6.2.2.1 Acceptance by academic finance

Fundamental analysis as a means of analysing economic variables and projecting expected future price trends was quick to be adopted by scholars of modern quantitative finance. In direct contrast to this, technical analysis has had its detractors from the earliest applications (Lo et al. 2000). This is particularly evident in the statement of Malkiel (1992) that, when placed under scientific scrutiny, chart-reading must share a pedestal with alchemy.

6.2.2.2 Underlying foundations

Fundamental analysis, also known as quantitative finance, is primarily algebraic and numerical and therefore employs the strategy of mathematical analysis or probability statistics in the forecasting and valuation of prices.

Technical analysis or charting is mainly visual in its application and implements geometry and pattern recognition in the forecasting of prices (Lo et al. 2000).

6.2.2.3 Cause versus effect

While technical analysts focus on the study of market action, fundamental analysts concentrate on economic forces such as supply and demand, which cause prices to move higher or lower. Thus, the fundamental approach aims to examine all relevant factors affecting futures prices in order to determine the intrinsic value of the market. Even though the methodology of technical trading differs substantially from that of fundamental trading, the objective of determining the likely direction of market movement is essentially the same. Analysts merely approach the objective from different directions; fundamental traders study the cause of market movement while technical traders examine the effect of market movement (Murphy 1999).

6.2.2.4 Lagging and leading indicators

Fundamental analysis tends to be a lagging indicator of market movement, since prices generally lead the known fundamental variables of the moment. Even though all known fundamentals are reflected in the market, prices seem to react to unknown variables. This is evident in history with the start of dramatic bullish or bearish markets without any perceived change in the factors determining prices. Once the change in variables becomes known, prices have already reacted and a new price trend is well underway. By studying price charts and historical market action, technical analysts are able to exploit future price action through the implementation of a trading strategy at a time when the strategy is not consistent with conventional wisdom. Therefore, technical analysis is a leading indicator of market movement. As a rule, technical analysts are in the minority when forecasting future price action at a specific period in time, but do not wait for the added confirmation of fundamental analysis before entering into a trade (Murphy 1999).

Given that technical analysis is a leading indicator of price movement, it should provide the user with a snapshot of predictable human behaviour while allowing the analyst the opportunity to better understand the underlying consumer or market psychology. By applying technical methods or oscillators to price data, changes in the mood of the market can be observed. These observations will result in predictions of the consequences of the interplay between market psychology and prices. Should the market price therefore drop to a specific price level on a number of times over a specific period and bounce back every time, it can logically be argued that the price level is attractive to buyers and this will be exploited by technical analysts.

Technical analysis does not attempt to discount the importance of fundamental variables in the realisation of prices. Charts in themselves do not result in fluctuating prices, but supply and demand forces eventually lead to either a bull or a bear market. Technical analysis merely reflects the bullish or bearish psychology of markets. The next section discusses appropriate literature on the price-forecasting effectiveness of technical analysts.

6.3 PRICE-FORECASTING ABILITY OF TECHNICAL ANALYSTS

Technical analysis, or charting, remains a controversial and divisive subject with contrasting views and theories exhibited by researchers. While proponents of technical analysis belief that this method of price forecasting is not given full appreciation and respect given its abilities as economic phenomenon, detractors continuously doubt the philosophy and rationale on which reported successes are based.

6.3.1 Literature rejecting effectiveness of technical analysis

Technical analysts study past prices and trends in order to anticipate future price movement (Kleinman 2005). In his empirical study, Malkiel (2003) investigated the notion of randomness in stock prices by analysing measures of short-run serial correlations between successive stock price changes. His findings suggested that the stock market has no memory and therefore research into historical price behaviour is of no help in determining how prices will behave in the future.

In response to suggestions that returns achieved by technical momentum strategies may lead to a rejection of the efficient market hypothesis, Odean (1999) conducted a survey among a sample of active and passive investors. He established that traders entering into a technical momentum strategy realised profits, but these profits were actually substantially less than what could have been earned through a passive buy and hold trade. This can be attributed to the essential amount of transaction costs involved in the implementation of momentum strategies. This conclusion is confirmed by research from Lesmond, Schill and Zhou (2001). Jensen and Benington (1970) piloted an empirical study on the possibility of improving investment returns by incorporating technical analysis into the investment strategy. They found that the addition of technical signals had no positive impact on the returns achieved. This conclusion correlates with that of earlier research on the subject by Fama and Blume (1966).

Another factor questioning the validity of technical analysis as price-forecasting method is the high level of subjectivity involved in the interpretation of price charts. Different technical analysts can make contradictory predictions from the same set of data if technical rules are not stipulated precisely. This inherent subjectivity suggests that technical analysis has little, if any, general predictive power. Lo et al. (2000) acknowledges the impact of

subjectivity and the threat it poses to the general recognition of technical analysis within the economic environment. In order to eliminate any uncertainty regarding subjectivity, they propose that analysts follow a systematic and automatic approach to technical pattern recognition by using non-parametric kernel regression.

6.3.2 Literature supporting technical analysis as forecasting method

In their research on the hypothesis that stock market prices move in random walks, Lo and MacKinlay (1999) found that short-run serial correlations are not zero. The existence of a number of continuous and successive price moves in the same direction suggests that technical trends are present in the market and therefore prices do not reflect the essence of a true and accepted random walk.

Murphy (1999) states that it is doubtful whether research will ever provide sufficient statistical evidence to prove or disprove the random walk theory. He comments that the principle of random markets will forever be rejected by the technical community since it implies that no forecasting technique can effectively operate within the free-market environment. This is confirmed by Brock et al. (1992) who found significant forecasting power through the application of a simple set of trading rules to the Dow Jones Industrial Average. The success of these trading strategies poses a challenge to academics contending that stock market prices are efficient and follow a random walk over time.

According to Kleinman (2005) technical analysis is the only tool which provides the individual trader with a decent chance against market professionals and multinational corporations. He confirms that certain technical approaches are more important than fundamentals, since technical analysis is not subject to false trend movements based upon inaccurate market information. Neftci (1991) came to a similar conclusion, which provides direct support to the statement that past prices may be used to forecast future returns to a certain degree. Murphy (1999) confirms this finding and states that the logical starting point in the forecasting of the business or economic future consists of gathering past observations. This implies that the use of past data in order to predict future price movements through technical analysis is grounded in sound statistical concepts. Lo et al. (2000) investigated the predictive ability of technical analysis. By applying sophisticated non-parametric statistical techniques to market prices with the objective of identifying price

patterns, these authors concluded that technical formations such as head and shoulders and double bottoms may in fact possess a modest amount of predictive power.

Spot or current asset prices provide information on expected future prices in the instance where market participants are heterogeneously informed. Spot prices are, however, imperfect aggregators of private information. As such, historical prices applied in conjunction with spot prices allow for an increased accuracy on past and present signals compared to exclusively current prices alone. Therefore, technical analysis provides information to traders, which spot prices are not able to reveal fully (Brown & Jennings 1989).

A number of alternative technical tools or oscillators can be used in an attempt to forecast prices successfully. These oscillators can be applied individually or together as a price risk management strategy.

6.4 TECHNICAL OSCILLATORS AND MOVING AVERAGES

Oscillators are indicators which determine when a market is trading in overbought or oversold conditions. Prices do not move straight up or straight down forever without corrective moves. At an uncertain time and price level in the future, prices will turn, either temporarily or permanently. According to Kleinman (2005), a market is said to be overbought when the specific oscillator reaches an upper extreme. At that moment, the market is deemed too high since it is running out of buyers and is therefore about to fall under its own weight. Once the oscillator fluctuates at a lower extreme, oversold conditions are present. This represents a period when the market is running out of sellers and prices approach a level at which a bounce can be expected.

Oscillators are of extreme value in non-trending markets where prices fluctuate in a narrow horizontal price band and trend-following systems do not work very effectively. The popularity of oscillators is attributed to the profitable trading opportunities they present during periods of sideways and trendless market conditions. In addition, oscillators often warn traders that a trend is losing momentum before this becomes apparent in the price itself. Oscillators are most useful in the following three situations (Murphy 1999):

- upon reaching an extreme reading near the upper or lower end of its boundaries;
- when divergence occurs between the oscillator and price action in a period of extreme readings; and
- a cross of the midpoint line (50%) provides an important signal regarding the direction of the price trend.

The most common oscillators used by technical analysts in the forecasting of prices include the relative strength index (RSI) and slow stochastic. Whilst the moving average is not recognised as an oscillator, it remains an essential forecasting tool when futures prices are in a trending phase.

6.4.1 Relative strength index (RSI)

Relative strength generally means a ratio line, which compares the recent performance of one entity with another (Bodie et al. 2002). A problem often faced by analysts in the construction of a momentum line is the dramatic impact caused by values being dropped off. As a result, the momentum line may act irrationally even though few price changes are actually observed. The need therefore exists for a smoothing strategy, which will minimise these price distortions. Another challenge is the construction of a constant range for comparison purposes. According to Murphy (1999), the RSI formula provides a solution for this through the creation of a constant vertical range of 0 to 100 and which also reflects the necessary smoothing required by traders. The mathematical equation for the RSI, as indicated by Kleinman (2005), is as follows:

RSI = 100 – {100/(1+RS)}
where RS = Average of net up closing changes for N# of days/Average of net down closing changes for N# of days

The number of days is chosen subjectively by the trader, though the most frequently used number remains 14 days for a daily price chart (Murphy 1999). The RSI ranges from just above 0 to just below 100, but it is extremely rare to find a number even close to these two extremes. Generally, the RSI fluctuates between 30 and 70 but in extreme situations, it may move below 30 or above 70.

A movement beyond these levels will indicate a possible reversal point and traders as a rule will go long the market (buy the commodity) once oversold and short the market (sell the commodity) when overbought.

6.4.1.1 Application of RSI on historical data

The working of the RSI will be illustrated by applying the formula to historical corn price data (see Table 6.1). For the purposes of this example the December 2009 CBOT corn price will be investigated.

Table 6.1 Application of RSI on CBOT December 2009 corn futures prices

Date	Corn (c/bushel)	RSI							Sell	Buy
		Change	Advance	Decline	Avg Gain	Avg Loss	RS	RSI		
20081203	394									
20081204	379	-15.00								
20081205	351	-28.00	0.00	28.00						
20081208	374	22.50	22.50	0.00						
20081209	372	-1.50	0.00	1.50						
20081210	387	15.00	15.00	0.00						
20081211	397	9.25	9.25	0.00						
20081212	420	23.50	23.50	0.00						
20081215	423	2.50	2.50	0.00						
20081216	442	19.00	19.00	0.00						
20081217	435	-6.25	0.00	6.25						
20081218	435	-0.50	0.00	0.50						
20081219	425	-9.75	0.00	9.75						
20081222	427	2.00	2.00	0.00						
20081223	440	12.75	12.75	0.00						
20081224	442	1.75	1.75	0.00	7.73	3.29	2.35	70.18	$4.42	
20081226	457	15.00	15.00	0.00	8.25	3.05	2.70	73.01	$4.57	
20081229	438	-18.25	0.00	18.25	7.66	4.14	1.85	64.94		
20081230	441	2.50	2.50	0.00	7.29	3.84	1.90	65.50		
20081231	452	10.75	10.75	0.00	7.54	3.57	2.11	67.89		
20090102	456	4.75	4.75	0.00	7.34	3.31	2.22	68.91		
20090105	455	-1.00	0.00	1.00	6.82	3.15	2.17	68.42		
20090106	471	16.00	16.00	0.00	7.47	2.92	2.56	71.89	$4.71	
20090107	461	-10.75	0.00	10.75	6.94	3.48	1.99	66.59		
20090108	450	-10.25	0.00	10.25	6.44	3.96	1.63	61.91		
20090109	454	4.00	4.00	0.00	6.27	3.68	1.70	63.00		
20090112	424	-30.00	0.00	30.00	5.82	5.56	1.05	51.14		
20090113	407	-17.25	0.00	17.25	5.41	6.40	0.85	45.80		
20090114	412	4.50	4.50	0.00	5.34	5.94	0.90	47.34		
20090115	411	-0.50	0.00	0.50	4.96	5.55	0.89	47.18		
20090116	437	25.75	25.75	0.00	6.44	5.15	1.25	55.56		
20090120	430	-6.75	0.00	6.75	5.98	5.27	1.14	53.18		
20090121	436	5.75	5.75	0.00	5.97	4.89	1.22	54.95		
20090122	434	-2.25	0.00	2.25	5.54	4.70	1.18	54.09		
20090123	436	2.50	2.50	0.00	5.32	4.37	1.22	54.93		
20090126	439	3.00	3.00	0.00	5.16	4.06	1.27	55.98		

Date	Corn (c/bushel)	RSI							Sell	Buy
20090127	423	-16.00	0.00	16.00	4.79	4.91	0.98	49.38		
20090128	430	7.00	7.00	0.00	4.95	4.56	1.09	52.05		
20090129	427	-2.75	0.00	2.75	4.59	4.43	1.04	50.91		
20090130	425	-2.25	0.00	2.25	4.27	4.27	1.00	49.96		
20090202	416	-9.00	0.00	9.00	3.96	4.61	0.86	46.21		
20090203	406	-9.75	0.00	9.75	3.68	4.98	0.74	42.49		
20090204	402	-4.50	0.00	4.50	3.42	4.94	0.69	40.86		
20090205	415	13.50	13.50	0.00	4.14	4.59	0.90	47.39		
20090206	422	6.50	6.50	0.00	4.30	4.26	1.01	50.24		
20090209	422	0.00	0.00	0.00	4.00	3.96	1.01	50.24		
20090210	421	-1.25	0.00	1.25	3.71	3.76	0.99	49.64		
20090211	410	-10.50	0.00	10.50	3.45	4.25	0.81	44.80		
20090212	408	-2.25	0.00	2.25	3.20	4.10	0.78	43.82		
20090213	406	-2.25	0.00	2.25	2.97	3.97	0.75	42.80		
20090217	390	-15.25	0.00	15.25	2.76	4.78	0.58	36.62		
20090218	388	-2.75	0.00	2.75	2.56	4.63	0.55	35.62		
20090219	394	6.25	6.25	0.00	2.83	4.30	0.66	39.65		
20090220	390	-4.00	0.00	4.00	2.62	4.28	0.61	38.01		
20090223	392	1.75	1.75	0.00	2.56	3.97	0.64	39.19		
20090224	394	2.75	2.75	0.00	2.57	3.69	0.70	41.10		
20090225	404	9.50	9.50	0.00	3.07	3.43	0.90	47.25		
20090226	402	-1.50	0.00	1.50	2.85	3.29	0.87	46.43		
20090227	391	-11.25	0.00	11.25	2.65	3.86	0.69	40.69		
20090302	380	-10.75	0.00	10.75	2.46	4.35	0.57	36.10		
20090303	381	0.50	0.50	0.00	2.32	4.04	0.57	36.46		
20090304	394	13.00	13.00	0.00	3.08	3.75	0.82	45.10		
20090305	388	-6.00	0.00	6.00	2.86	3.91	0.73	42.24		
20090306	391	3.00	3.00	0.00	2.87	3.63	0.79	44.15		
20090309	396	5.25	5.25	0.00	3.04	3.37	0.90	47.41		
20090310	407	10.75	10.75	0.00	3.59	3.13	1.15	53.42		
20090311	396	-10.75	0.00	10.75	3.33	3.68	0.91	47.57		
20090312	416	19.75	19.75	0.00	4.51	3.41	1.32	56.91		
20090313	418	2.25	2.25	0.00	4.35	3.17	1.37	57.83		
20090316	421	3.25	3.25	0.00	4.27	2.94	1.45	59.19		
20090317	421	-0.50	0.00	0.50	3.96	2.77	1.43	58.87		
20090318	419	-2.00	0.00	2.00	3.68	2.71	1.36	57.56		
20090319	428	9.50	9.50	0.00	4.10	2.52	1.63	61.91		
20090320	428	-0.25	0.00	0.25	3.80	2.36	1.61	61.73		
20090323	427	-0.75	0.00	0.75	3.53	2.24	1.57	61.16		
20090324	425	-2.00	0.00	2.00	3.28	2.23	1.47	59.57		
20090325	418	-7.75	0.00	7.75	3.04	2.62	1.16	53.75		
20090326	423	5.25	5.25	0.00	3.20	2.43	1.32	56.83		
20090327	419	-3.50	0.00	3.50	2.97	2.51	1.19	54.24		
20090330	418	-1.00	0.00	1.00	2.76	2.40	1.15	53.49		
20090331	436	17.50	17.50	0.00	3.81	2.23	1.71	63.11		
20090401	427	-8.50	0.00	8.50	3.54	2.68	1.32	56.95		
20090402	434	6.50	6.50	0.00	3.75	2.49	1.51	60.15		
20090403	436	1.75	1.75	0.00	3.61	2.31	1.56	60.99		
20090406	437	1.25	1.25	0.00	3.44	2.14	1.61	61.61		
20090407	428	-9.25	0.00	9.25	3.20	2.65	1.21	54.65		
20090408	428	0.25	0.25	0.00	2.99	2.46	1.21	54.80		

Date	Corn (c/bushel)	RSI							Sell	Buy
20090409	422	-6.00	0.00	6.00	2.77	2.71	1.02	50.52		
20090413	419	-2.50	0.00	2.50	2.57	2.70	0.95	48.81		
20090414	425	5.50	5.50	0.00	2.78	2.51	1.11	52.61		
20090415	415	-9.50	0.00	9.50	2.58	3.01	0.86	46.23		
20090416	417	1.50	1.50	0.00	2.51	2.79	0.90	47.31		
20090417	407	-9.75	0.00	9.75	2.33	3.29	0.71	41.45		
20090420	399	-8.25	0.00	8.25	2.16	3.64	0.59	37.24		
20090421	404	4.75	4.75	0.00	2.35	3.38	0.69	40.95		
20090422	403	-0.25	0.00	0.25	2.18	3.16	0.69	40.82		
20090423	412	8.25	8.25	0.00	2.61	2.93	0.89	47.11		
20090424	407	-4.75	0.00	4.75	2.43	3.06	0.79	44.19		
20090427	402	-5.25	0.00	5.25	2.25	3.22	0.70	41.17		
20090428	404	2.75	2.75	0.00	2.29	2.99	0.77	43.36		
20090429	422	17.50	17.50	0.00	3.37	2.78	1.22	54.87		
20090430	423	1.50	1.50	0.00	3.24	2.58	1.26	55.70		
20090501	433	10.00	10.00	0.00	3.72	2.39	1.56	60.87		
20090504	426	-7.75	0.00	7.75	3.46	2.78	1.25	55.47		
20090505	425	-0.50	0.00	0.50	3.21	2.61	1.23	55.13		
20090506	427	1.75	1.75	0.00	3.11	2.43	1.28	56.14		
20090507	431	4.25	4.25	0.00	3.19	2.25	1.41	58.59		
20090508	440	8.75	8.75	0.00	3.59	2.09	1.71	63.15		
20090511	440	0.50	0.50	0.00	3.36	1.94	1.73	63.39		
20090512	448	7.75	7.75	0.00	3.68	1.80	2.04	67.09		
20090513	447	-0.75	0.00	0.75	3.42	1.73	1.98	66.39		
20090514	449	2.00	2.00	0.00	3.31	1.61	2.06	67.37		
20090515	439	-10.75	0.00	10.75	3.08	2.26	1.36	57.67		
20090518	442	3.50	3.50	0.00	3.11	2.10	1.48	59.71		
20090519	447	5.00	5.00	0.00	3.24	1.95	1.67	62.48		
20090520	447	0.25	0.25	0.00	3.03	1.81	1.68	62.62		
20090521	446	-1.75	0.00	1.75	2.81	1.80	1.56	60.92		
20090522	452	6.50	6.50	0.00	3.08	1.68	1.84	64.74		
20090526	450	-1.75	0.00	1.75	2.86	1.68	1.70	62.96		
20090527	450	-0.50	0.00	0.50	2.65	1.60	1.66	62.43		
20090528	452	2.50	2.50	0.00	2.64	1.48	1.78	64.05		
20090529	459	7.00	7.00	0.00	2.95	1.38	2.15	68.21		
20090601	469	10.00	10.00	0.00	3.46	1.28	2.70	73.00	$4.69	
20090602	473	3.50	3.50	0.00	3.46	1.19	2.91	74.46	$4.73	
20090603	455	-17.75	0.00	17.75	3.21	2.37	1.36	57.54		
20090604	472	16.50	16.50	0.00	4.16	2.20	1.89	65.41		
20090605	468	-4.00	0.00	4.00	3.86	2.33	1.66	62.39		
20090608	458	-9.50	0.00	9.50	3.59	2.84	1.26	55.81		
20090609	466	8.25	8.25	0.00	3.92	2.64	1.49	59.78		
20090610	458	-8.25	0.00	8.25	3.64	3.04	1.20	54.50		
20090611	463	5.25	5.25	0.00	3.76	2.82	1.33	57.10		
20090612	448	-15.50	0.00	15.50	3.49	3.73	0.94	48.34		
20090615	428	-20.00	0.00	20.00	3.24	4.89	0.66	39.84		
20090616	425	-2.50	0.00	2.50	3.01	4.72	0.64	38.92		
20090617	429	3.50	3.50	0.00	3.04	4.38	0.69	40.98		
20090618	424	-5.00	0.00	5.00	2.83	4.43	0.64	38.96		
20090619	420	-4.25	0.00	4.25	2.62	4.41	0.59	37.28		
20090622	406	-14.00	0.00	14.00	2.44	5.10	0.48	32.33		

Date	Corn (c/bushel)	RSI							Sell	Buy
20090623	409	3.50	3.50	0.00	2.51	4.73	0.53	34.67		
20090624	407	-1.75	0.00	1.75	2.33	4.52	0.52	34.03		
20090625	402	-5.75	0.00	5.75	2.17	4.61	0.47	31.97		
20090626	404	2.75	2.75	0.00	2.21	4.28	0.52	34.03		
20090629	397	-7.00	0.00	7.00	2.05	4.47	0.46	31.42		
20090630	367	-30.00	0.00	30.00	1.90	6.30	0.30	23.21		$3.67
20090701	369	2.00	2.00	0.00	1.91	5.85	0.33	24.63		$3.69
20090702	358	-11.75	0.00	11.75	1.77	6.27	0.28	22.06		$3.58
20090706	344	-13.25	0.00	13.25	1.65	6.77	0.24	19.58		$3.44
20090707	336	-8.50	0.00	8.50	1.53	6.89	0.22	18.16		$3.36
20090708	334	-1.50	0.00	1.50	1.42	6.51	0.22	17.92		$3.34
20090709	340	5.75	5.75	0.00	1.73	6.04	0.29	22.26		$3.40
20090710	338	-2.00	0.00	2.00	1.61	5.75	0.28	21.82		$3.38
20090713	340	1.50	1.50	0.00	1.60	5.34	0.30	23.03		$3.40
20090714	346	6.00	6.00	0.00	1.91	4.96	0.39	27.83		$3.46
20090715	338	-8.00	0.00	8.00	1.78	5.18	0.34	25.54		$3.38
20090716	325	-12.25	0.00	12.25	1.65	5.68	0.29	22.50		$3.25
20090717	332	6.25	6.25	0.00	1.98	5.28	0.37	27.26		$3.32
20090720	334	2.25	2.25	0.00	2.00	4.90	0.41	28.96		$3.34
20090721	322	-11.75	0.00	11.75	1.85	5.39	0.34	25.60		$3.22
20090722	319	-2.75	0.00	2.75	1.72	5.20	0.33	24.88		$3.19
20090723	339	19.50	19.50	0.00	2.99	4.83	0.62	38.26		
20090724	327	-11.50	0.00	11.50	2.78	5.31	0.52	34.37		
20090727	334	6.50	6.50	0.00	3.04	4.93	0.62	38.19		
20090728	330	-4.00	0.00	4.00	2.83	4.86	0.58	36.77		
20090729	328	-1.75	0.00	1.75	2.62	4.64	0.57	36.14		
20090730	342	14.25	14.25	0.00	3.46	4.31	0.80	44.51		
20090731	350	7.25	7.25	0.00	3.73	4.00	0.93	48.23		
20090803	369	19.50	19.50	0.00	4.85	3.71	1.31	56.65		
20090804	366	-3.25	0.00	3.25	4.51	3.68	1.22	55.04		
20090805	357	-8.75	0.00	8.75	4.18	4.04	1.04	50.86		
20090806	340	-16.75	0.00	16.75	3.89	4.95	0.78	43.97		
20090807	327	-13.75	0.00	13.75	3.61	5.58	0.65	39.27		
20090810	331	4.00	4.00	0.00	3.64	5.18	0.70	41.24		
20090811	331	0.50	0.50	0.00	3.41	4.81	0.71	41.50		
20090812	336	5.25	5.25	0.00	3.54	4.47	0.79	44.24		
20090813	332	-4.25	0.00	4.25	3.29	4.45	0.74	42.50		
20090814	328	-4.25	0.00	4.25	3.06	4.44	0.69	40.78		
20090817	322	-6.00	0.00	6.00	2.84	4.55	0.62	38.41		
20090818	323	0.75	0.75	0.00	2.69	4.22	0.64	38.89		
20090819	328	5.00	5.00	0.00	2.85	3.92	0.73	42.11		
20090820	324	-3.50	0.00	3.50	2.65	3.89	0.68	40.50		
20090821	326	2.25	2.25	0.00	2.62	3.61	0.73	42.04		
20090824	336	9.25	9.25	0.00	3.09	3.36	0.92	47.97		
20090825	327	-8.75	0.00	8.75	2.87	3.74	0.77	43.44		
20090826	326	-0.50	0.00	0.50	2.67	3.51	0.76	43.19		
20090827	329	3.00	3.00	0.00	2.69	3.26	0.83	45.23		
20090828	329	-0.25	0.00	0.25	2.50	3.04	0.82	45.09		
20090831	330	0.75	0.75	0.00	2.37	2.83	0.84	45.65		
20090901	319	-10.50	0.00	10.50	2.20	3.37	0.65	39.52		
20090902	319	0.00	0.00	0.00	2.05	3.13	0.65	39.52		

Date	Corn (c/bushel)	RSI							Sell	Buy
20090903	316	-3.50	0.00	3.50	1.90	3.16	0.60	37.57		
20090904	306	-9.50	0.00	9.50	1.77	3.61	0.49	32.83		
20090908	308	1.25	1.25	0.00	1.73	3.35	0.52	34.01		
20090909	310	2.25	2.25	0.00	1.77	3.11	0.57	36.18		
20090910	315	5.50	5.50	0.00	2.03	2.89	0.70	41.27		
20090911	320	4.50	4.50	0.00	2.21	2.69	0.82	45.13		
20090914	318	-2.00	0.00	2.00	2.05	2.64	0.78	43.75		
20090915	347	28.75	28.75	0.00	3.96	2.45	1.62	61.78		
20090916	336	-10.25	0.00	10.25	3.68	3.01	1.22	55.01		
20090917	329	-7.25	0.00	7.25	3.41	3.31	1.03	50.77		
20090918	318	-11.00	0.00	11.00	3.17	3.86	0.82	45.10		
20090921	316	-2.00	0.00	2.00	2.94	3.73	0.79	44.13		
20090922	326	9.75	9.75	0.00	3.43	3.46	0.99	49.78		
20090923	330	4.50	4.50	0.00	3.51	3.21	1.09	52.18		
20090924	337	6.25	6.25	0.00	3.70	2.98	1.24	55.38		
20090925	334	-2.50	0.00	2.50	3.44	2.95	1.17	53.83		
20090928	339	4.75	4.75	0.00	3.53	2.74	1.29	56.33		
20090929	341	2.25	2.25	0.00	3.44	2.54	1.35	57.50		
20090930	344	3.00	3.00	0.00	3.41	2.36	1.44	59.08		
20091001	341	-3.50	0.00	3.50	3.16	2.44	1.30	56.44		
20091002	334	-7.00	0.00	7.00	2.94	2.77	1.06	51.50		
20091005	342	8.00	8.00	0.00	3.30	2.57	1.28	56.22		
20091006	358	16.75	16.75	0.00	4.26	2.39	1.79	64.10		
20091007	360	1.50	1.50	0.00	4.06	2.22	1.83	64.71		
20091008	364	4.25	4.25	0.00	4.08	2.06	1.98	66.46		
20091009	362	-1.75	0.00	1.75	3.79	2.04	1.86	65.03		
20091012	381	19.00	19.00	0.00	4.87	1.89	2.58	72.05	$3.81	
20091013	382	0.50	0.50	0.00	4.56	1.76	2.60	72.21	$3.82	
20091014	383	1.25	1.25	0.00	4.32	1.63	2.65	72.62	$3.83	
20091015	373	-10.00	0.00	10.00	4.01	2.23	1.80	64.31		
20091016	372	-1.00	0.00	1.00	3.73	2.14	1.74	63.53		
20091019	386	14.25	14.25	0.00	4.48	1.99	2.25	69.27		
20091020	385	-1.75	0.00	1.75	4.16	1.97	2.11	67.86		
20091021	398	13.75	13.75	0.00	4.84	1.83	2.65	72.59	$3.98	
20091022	404	5.25	5.25	0.00	4.87	1.70	2.87	74.15	$4.04	
20091023	398	-5.75	0.00	5.75	4.53	1.99	2.28	69.48		
20091026	378	-19.75	0.00	19.75	4.20	3.26	1.29	56.34		
20091027	371	-7.25	0.00	7.25	3.90	3.54	1.10	52.42		
20091028	369	-1.75	0.00	1.75	3.62	3.41	1.06	51.49		
20091029	380	10.50	10.50	0.00	4.11	3.17	1.30	56.48		
20091030	366	-13.50	0.00	13.50	3.82	3.91	0.98	49.43		
20091102	382	16.25	16.25	0.00	4.71	3.63	1.30	56.47		
20091103	390	7.75	7.75	0.00	4.93	3.37	1.46	59.38		
20091104	384	-6.00	0.00	6.00	4.57	3.56	1.29	56.25		
20091105	377	-7.50	0.00	7.50	4.25	3.84	1.11	52.52		
20091106	367	-9.50	0.00	9.50	3.94	4.24	0.93	48.17		
20091109	386	19.00	19.00	0.00	5.02	3.94	1.27	56.02		
20091110	395	8.50	8.50	0.00	5.27	3.66	1.44	59.01		
20091111	394	-0.50	0.00	0.50	4.89	3.43	1.42	58.76		
20091112	391	-3.50	0.00	3.50	4.54	3.44	1.32	56.92		
20091113	391	0.00	0.00	0.00	4.22	3.19	1.32	56.92		

Date	Corn (c/bushel)	RSI							Sell	Buy
20091116	402	11.75	11.75	0.00	4.76	2.96	1.60	61.60		
20091117	402	-0.25	0.00	0.25	4.42	2.77	1.59	61.45		
20091118	398	-4.00	0.00	4.00	4.10	2.86	1.43	58.93		
20091119	395	-3.00	0.00	3.00	3.81	2.87	1.33	57.03		
20091120	391	-4.00	0.00	4.00	3.54	2.95	1.20	54.52		
20091123	387	-3.75	0.00	3.75	3.28	3.01	1.09	52.20		
20091124	376	-11.25	0.00	11.25	3.05	3.60	0.85	45.89		
20091125	392	16.00	16.00	0.00	3.97	3.34	1.19	54.34		
20091127	397	5.25	5.25	0.00	4.06	3.10	1.31	56.73		
20091130	403	5.50	5.50	0.00	4.17	2.88	1.45	59.15		
20091201	400	-3.00	0.00	3.00	3.87	2.89	1.34	57.27		
20091202	392	-8.00	0.00	8.00	3.59	3.25	1.10	52.49		
20091203	385	-6.50	0.00	6.50	3.34	3.48	0.96	48.92		
20091204	374	-11.50	0.00	11.50	3.10	4.06	0.76	43.30		
20091207	369	-5.00	0.00	5.00	2.88	4.12	0.70	41.09		
20091208	370	0.75	0.75	0.00	2.73	3.83	0.71	41.57		
20091209	368	-1.50	0.00	1.50	2.53	3.66	0.69	40.85		
20091210	377	9.25	9.25	0.00	3.01	3.40	0.88	46.95		
20091211	389	12.00	12.00	0.00	3.65	3.16	1.16	53.63		
20091214	392	2.75	2.75	0.00	3.59	2.93	1.22	55.02		

Source: CME Group (2011)

6.4.1.2 Returns achieved from application of the RSI

By applying the RSI to the CBOT December 2009 corn futures contract, an average buy signal of $3.40/bushel is obtained, while the average sell signal realises a return of $4.26/bushel.

The buy and sell signals are illustrated in Figure 6.1. The red circles indicate an RSI above 70, which represents a sell signal. The green circle represents an RSI below 30, which triggers a buy signal.

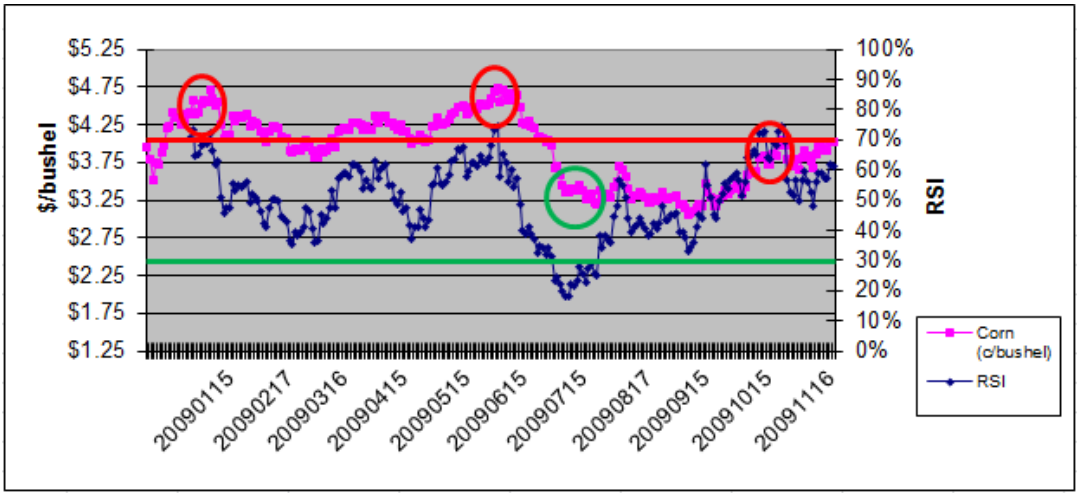

Figure 6.1 Graphical illustration of RSI signals on CBOT December 2009 corn futures prices

Source: CME Group (2011)

6.4.2 Stochastic indicator

The slow stochastic oscillator is widely followed and popular. While being more complex in nature, it aims to measure the extent by which the daily market closing price influences the trend. The stochastic indicator states that, as prices increase, closing prices tend to be closer to the upper end of the daily trading range. This suggests that bull markets can be identified by daily closing prices close to the highest trade of the day. In a market characterised by decreasing prices, the daily close tends to be closer to the lower end of the daily trading range. As such, bear markets will experience daily closing prices around the lowest trade for the day (Murphy 1999). Therefore, the manner in which the market closes determines the stochastic trend. In other words, the stochastic indicator measures how the most current close relates to where prices have been during the period under study (Kleinman 2005).

Two lines are used in the stochastic process, namely a %K-line which is more sensitive and the %D-line which is slower moving, and actually provides the trading signals. For the purposes of the formula, 14 days are widely used as it identifies longer-term moves and eliminates the majority of the whipsaws of the shorter variety (Kleinman 2005). The formula measures on a percentage scale from 0 to 100 the location of the closing price in relation to the total price range for a particular time-period (Murphy 1999). Generally, the stochastic indicator fluctuates between 30 and 70 but at extremes it may move below 30 or above 70. This will indicate a possible reversal point and traders, as a rule, will go long (buy) the market once oversold and short (sell) the market when overbought. Although many traders apply the stochastic on levels of 20 and 80, this allows for fewer trading opportunities and, as such, this study will use the 30 and 70 levels as signals of trading opportunity. The mathematical equation for the stochastic is as follows:

$$\%K = 100\,[(C - L14) / (H14 - L14)]$$

where C = latest close
L14 = lowest low for the last 14 periods
H14 = highest high for the last 14 periods

The %D-line is a 3-period moving average of the %K-line. Whereas the %K-line is known as fast stochastic, the %D-line is referred to as slow stochastic. Most traders make use of

either the slow stochastic individually, or in conjunction with the fast stochastic in the calculation of trading signals (Murphy 1999).

6.4.2.1 Application of stochastic-oscillator on historical data

The working of the stochastic oscillator will be illustrated by applying the formula to historical corn price data (see Table 6.2). For the purposes of this example, the December 2009 CBOT corn price will be investigated.

Table 6.2 Application of stochastic oscillator on CBOT December 2009 corn futures prices

				STOCHASTIC							
Date	Low	High	Close	Last close	Lowest low	Highest high		%K	%L	Sell	Buy
20081203	393	398	394								
20081204	380	392	379								
20081205	349	368	351								
20081208	369	378	374								
20081209	370	381	372								
20081210	379	388	387								
20081211	385	401	397								
20081212	385	425	420								
20081215	421	437	423								
20081216	426	444	442								
20081217	430	449	435								
20081218	427	435	435								
20081219	420	428	425								
20081222	423	428	427	427.00	349.25	473.00	62.83				
20081223	427	439	440	439.75	349.25	473.00	73.13				
20081224	437	441	442	441.50	349.25	473.00	74.55	70.17			
20081226	442	458	457	456.50	369.00	473.00	84.13	77.27			
20081229	438	464	438	438.25	369.50	473.00	66.43	75.04	74.16	$4.38	
20081230	433	442	441	440.75	379.00	473.00	65.69	72.08	74.80	$4.41	
20081231	436	450	452	451.50	384.75	473.00	75.64	69.25	72.12		
20090102	447	457	456	456.25	385.00	473.00	80.97	74.10	71.81	$4.56	
20090105	449	459	455	455.25	419.75	473.00	66.67	74.42	72.59	$4.55	
20090106	458	472	471	471.25	419.75	473.00	96.71	81.45	76.66	$4.71	
20090107	458	464	461	460.50	419.75	473.00	76.53	79.97	78.61	$4.61	
20090108	450	460	450	450.25	419.75	473.00	57.28	76.84	79.42	$4.50	
20090109	452	460	454	454.25	419.75	473.00	64.79	66.20	74.33		
20090112	424	430	424	424.25	423.25	473.00	2.01	41.36	61.46		
20090113	408	422	407	407.00	407.50	473.00	-0.76	22.01	43.19		
20090114	405	413	412	411.50	404.50	473.00	10.22	3.82	22.40		$4.12
20090115	405	415	411	411.00	404.50	473.00	9.49	6.31	10.72		$4.11
20090116	419	437	437	436.75	404.50	473.00	47.08	22.26	10.80		$4.37
20090120	425	448	430	430.00	404.50	473.00	37.23	31.27	19.95		
20090121	424	435	436	435.75	404.50	473.00	45.62	43.31	32.28		
20090122	425	434	434	433.50	404.50	473.00	42.34	41.73	38.77		
20090123	431	445	436	436.00	404.50	473.00	45.99	44.65	43.23		
20090126	437	446	439	439.00	404.50	473.00	50.36	46.23	44.20		
20090127	423	432	423	423.00	404.50	473.00	27.01	41.12	44.00		
20090128	419	430	430	430.00	404.50	473.00	37.23	38.20	41.85		
20090129	425	428	427	427.25	404.50	473.00	33.21	32.48	37.27		
20090130	425	430	425	425.00	404.50	473.00	29.93	33.45	34.71		

				STOCHASTIC							
Date	Low	High	Close	Last close	Lowest low	Highest high		%K	%L	Sell	Buy
20090202	410	419	416	416.00	404.50	473.00	16.79	26.64	30.86		
20090203	402	411	406	406.25	401.75	473.00	6.32	17.68	25.92		$4.06
20090204	402	412	402	401.75	401.50	473.00	0.35	7.82	17.38		$4.02
20090205	404	415	415	415.25	401.50	473.00	19.23	8.63	11.38		$4.15
20090206	416	424	422	421.75	401.50	473.00	28.32	15.97	10.81		$4.22
20090209	422	427	422	421.75	401.50	473.00	28.32	25.29	16.63		$4.22
20090210	413	424	421	420.50	401.50	473.00	26.57	27.74	23.00		$4.21
20090211	410	419	410	410.00	401.50	473.00	11.89	22.26	25.10		$4.10
20090212	408	418	408	407.75	401.50	473.00	8.74	15.73	21.91		$4.08
20090213	406	410	406	405.50	401.50	473.00	5.59	8.74	15.58		$4.06
20090217	388	399	390	390.25	388.00	473.00	2.65	5.66	10.05		$3.90
20090218	386	391	388	387.50	386.00	473.00	1.72	3.32	5.91		$3.88
20090219	391	396	394	393.75	386.00	473.00	8.91	4.43	4.47		$3.94
20090220	382	392	390	389.75	382.00	473.00	8.52	6.38	4.71		$3.90
20090223	390	397	392	391.50	382.00	473.00	10.44	9.29	6.70		$3.92
20090224	387	394	394	394.25	382.00	473.00	13.46	10.81	8.83		$3.94
20090225	391	408	404	403.75	382.00	473.00	23.90	15.93	12.01		$4.04
20090226	398	410	402	402.25	382.00	473.00	22.25	19.87	15.54		$4.02
20090227	389	397	391	391.00	382.00	473.00	9.89	18.68	18.16		$3.91
20090302	376	382	380	380.25	375.50	473.00	4.87	12.34	16.96		$3.80
20090303	378	384	381	380.75	375.50	473.00	5.38	6.72	12.58		$3.81
20090304	388	395	394	393.75	375.50	473.00	18.72	9.66	9.57		$3.94
20090305	387	392	388	387.75	375.50	473.00	12.56	12.22	9.53		$3.88
20090306	390	394	391	390.75	375.50	473.00	15.64	15.64	12.51		$3.91
20090309	396	400	396	396.00	375.50	473.00	21.03	16.41	14.76		$3.96
20090310	406	413	407	406.75	375.50	473.00	32.05	22.91	18.32		$4.07
20090311	395	410	396	396.00	375.50	473.00	21.03	24.70	21.34		$3.96
20090312	400	418	416	415.75	375.50	473.00	41.28	31.45	26.35		
20090313	414	419	418	418.00	375.50	473.00	43.59	35.30	30.48		
20090316	418	427	421	421.25	375.50	473.00	46.92	43.93	36.89		
20090317	419	424	421	420.75	375.50	473.00	46.41	45.64	41.62		
20090318	416	422	419	418.75	375.50	473.00	44.36	45.90	45.16		
20090319	426	434	428	428.25	375.50	473.00	54.10	48.29	46.61		
20090320	427	430	428	428.00	378.25	473.00	52.51	50.32	48.17		
20090323	425	435	427	427.25	386.50	473.00	47.11	51.24	49.95		
20090324	424	428	425	425.25	386.50	473.00	44.80	48.14	49.90		
20090325	417	421	418	417.50	389.50	473.00	33.53	41.81	47.06		
20090326	420	424	423	422.75	395.00	473.00	35.58	37.97	42.64		
20090327	417	421	419	419.25	395.00	473.00	31.09	33.40	37.73		
20090330	412	419	418	418.25	395.00	473.00	29.81	32.16	34.51		
20090331	414	437	436	435.75	399.75	473.00	49.15	36.68	34.08		
20090401	424	432	427	427.25	411.50	473.00	25.61	34.85	34.56		
20090402	431	438	434	433.75	411.50	473.00	36.18	36.98	36.17		
20090403	429	436	436	435.50	411.50	473.00	39.02	33.60	35.15		
20090406	432	437	437	436.75	411.50	473.00	41.06	38.75	36.45		
20090407	427	435	428	427.50	411.50	473.00	26.02	35.37	35.91		
20090408	423	433	428	427.75	411.50	473.00	26.42	31.17	35.09		
20090409	421	436	422	421.75	411.50	473.00	16.67	23.04	29.86		$4.22
20090413	415	421	419	419.25	411.50	473.00	12.60	18.56	24.25		$4.19
20090414	420	428	425	424.75	411.50	473.00	21.54	16.94	19.51		$4.25
20090415	415	423	415	415.25	411.50	473.00	6.10	13.41	16.31		$4.15
20090416	412	417	417	416.75	411.50	473.00	8.54	12.06	14.14		$4.17
20090417	407	418	407	407.00	406.50	473.00	0.75	5.13	10.20		$4.07
20090420	391	401	399	398.75	390.50	473.00	10.00	6.43	7.87		$3.99
20090421	400	408	404	403.50	390.50	473.00	15.76	8.84	6.80		$4.04
20090422	400	407	403	403.25	390.50	473.00	15.45	13.74	9.67		$4.03

				STOCHASTIC							
Date	Low	High	Close	Last close	Lowest low	Highest high		%K	%L	Sell	Buy
20090423	407	412	412	411.50	390.50	473.00	25.45	18.89	13.82		$4.12
20090424	405	416	407	406.75	390.50	473.00	19.70	20.20	17.61		$4.07
20090427	396	404	402	401.50	390.50	473.00	13.33	19.49	19.53		$4.02
20090428	400	406	404	404.25	390.50	473.00	16.67	16.57	18.75		$4.04
20090429	408	422	422	421.75	390.50	473.00	37.88	22.63	19.56		$4.22
20090430	416	428	423	423.25	390.50	473.00	39.70	31.41	23.54		
20090501	424	435	433	433.25	390.50	473.00	51.82	43.13	32.39		
20090504	421	432	426	425.50	390.50	473.00	42.42	44.65	39.73		
20090505	417	427	425	425.00	390.50	473.00	41.82	45.35	44.38		
20090506	423	428	427	426.75	390.50	473.00	43.94	42.73	44.24		
20090507	428	439	431	431.00	390.50	473.00	49.09	44.95	44.34		
20090508	435	440	440	439.75	396.00	473.00	56.82	49.95	45.88		
20090511	437	441	440	440.25	396.00	473.00	57.47	54.46	49.79		
20090512	447	450	448	448.00	396.00	473.00	67.53	60.61	55.00		
20090513	442	454	447	447.25	396.00	473.00	66.56	63.85	59.64		
20090514	445	450	449	449.25	396.00	473.00	69.16	67.75	64.07		
20090515	437	451	439	438.50	400.25	473.00	52.58	62.76	64.79		
20090518	433	446	442	442.00	407.75	473.00	52.49	58.07	62.86		
20090519	443	450	447	447.00	415.75	473.00	54.59	53.22	58.02		
20090520	445	456	447	447.25	417.00	473.00	54.02	53.70	55.00		
20090521	439	449	446	445.50	417.00	473.00	50.89	53.17	53.36		
20090522	449	456	452	452.00	417.00	473.00	62.50	55.80	54.22		
20090526	445	455	450	450.25	423.00	473.00	54.50	55.96	54.98		
20090527	448	456	450	449.75	428.00	473.00	48.33	55.11	55.63		
20090528	447	458	452	452.25	433.00	473.00	48.13	50.32	53.80		
20090529	455	460	459	459.25	433.00	473.00	65.63	54.03	53.15		
20090601	464	469	469	469.25	433.00	473.00	90.63	68.13	57.49		
20090602	465	473	473	472.75	433.00	473.00	99.38	85.21	69.12		
20090603	454	469	455	455.00	433.00	473.00	55.00	81.67	78.33	$4.55	
20090604	459	471	472	471.50	433.00	473.00	96.25	83.54	83.47	$4.72	
20090605	464	470	468	467.50	433.00	473.00	86.25	79.17	81.46	$4.68	
20090608	457	464	458	458.00	439.00	473.00	55.88	79.46	80.72	$4.58	
20090609	463	468	466	466.25	439.00	473.00	80.15	74.09	77.57	$4.66	
20090610	457	472	458	458.00	439.00	473.00	55.88	63.97	72.51		
20090611	462	469	463	463.25	445.00	473.00	65.18	67.07	68.38		
20090612	443	459	448	447.75	443.25	473.00	15.13	45.40	58.81		
20090615	427	438	428	427.75	427.25	473.00	1.09	27.13	46.53		
20090616	424	433	425	425.25	424.25	473.00	2.05	6.09	26.21		$4.25
20090617	419	430	429	428.75	419.25	473.00	17.67	6.94	13.39		$4.29
20090618	423	428	424	423.75	419.25	473.00	8.37	9.37	7.47		$4.24
20090619	419	428	420	419.50	418.50	473.00	1.83	9.29	8.53		$4.20
20090622	401	409	406	405.50	400.50	471.50	7.04	5.75	8.14		$4.06
20090623	401	410	409	409.00	400.50	471.50	11.97	6.95	7.33		$4.09
20090624	402	411	407	407.25	400.50	471.50	9.51	9.51	7.40		$4.07
20090625	401	408	402	401.50	400.50	471.50	1.41	7.63	8.03		$4.02
20090626	399	406	404	404.25	399.00	471.50	7.24	6.05	7.73		$4.04
20090629	396	403	397	397.25	396.00	471.50	1.66	3.44	5.71		$3.97
20090630	367	375	367	367.25	367.25	469.25	0.00	2.97	4.15		$3.67
20090701	362	374	369	369.25	362.00	458.75	7.49	3.05	3.15		$3.69
20090702	357	364	358	357.50	357.00	438.00	0.62	2.70	2.91		$3.58
20090706	344	350	344	344.25	343.75	432.50	0.56	2.89	2.88		$3.44
20090707	335	350	336	335.75	335.00	429.75	0.79	0.66	2.08		$3.36
20090708	332	340	334	334.25	332.00	428.00	2.34	1.23	1.59		$3.34
20090709	336	341	340	340.00	332.00	427.75	8.36	3.83	1.91		$3.40
20090710	329	339	338	338.00	328.50	413.00	11.24	7.31	4.13		$3.38
20090713	330	340	340	339.50	328.50	413.00	13.02	10.87	7.34		$3.40

				STOCHASTIC							
Date	Low	High	Close	Last close	Lowest low	Highest high		%K	%L	Sell	Buy
20090714	340	346	346	345.50	328.50	413.00	20.12	14.79	10.99		$3.46
20090715	336	349	338	337.50	328.50	413.00	10.65	14.60	13.42		$3.38
20090716	325	335	325	325.25	324.75	413.00	0.57	10.45	13.28		$3.25
20090717	325	332	332	331.50	324.75	413.00	7.65	6.29	10.44		$3.32
20090720	329	334	334	333.75	324.75	413.00	10.20	6.14	7.62		$3.34
20090721	321	333	322	322.00	320.50	413.00	1.62	6.49	6.31		$3.22
20090722	315	321	319	319.25	314.75	413.00	4.58	5.47	6.03		$3.19
20090723	327	340	339	338.75	314.75	413.00	24.43	10.21	7.39		$3.39
20090724	326	339	327	327.25	314.75	413.00	12.72	13.91	9.86		$3.27
20090727	325	335	334	333.75	314.75	413.00	19.34	18.83	14.32		$3.34
20090728	330	336	330	329.75	314.75	413.00	15.27	15.78	16.17		$3.30
20090729	323	328	328	328.00	314.75	413.00	13.49	16.03	16.88		$3.28
20090730	335	344	342	342.25	314.75	413.00	27.99	18.91	16.91		$3.42
20090731	340	350	350	349.50	314.75	413.00	35.37	25.61	20.19		$3.50
20090803	361	375	369	369.00	314.75	413.00	55.22	39.53	28.02		
20090804	364	372	366	365.75	314.75	413.00	51.91	47.50	37.55		
20090805	349	368	357	357.00	314.75	413.00	43.00	50.04	45.69		
20090806	339	351	340	340.25	314.75	413.00	25.95	40.29	45.94		
20090807	326	340	327	326.50	314.75	413.00	11.96	26.97	39.10		
20090810	328	336	331	330.50	314.75	413.00	16.03	17.98	28.41		$3.31
20090811	329	333	331	331.00	322.75	413.00	9.14	12.38	19.11		$3.31
20090812	322	339	336	336.25	322.00	413.00	15.66	13.61	14.66		$3.36
20090813	331	343	332	332.00	322.00	413.00	10.99	11.93	12.64		$3.32
20090814	326	329	328	327.75	322.00	413.00	6.32	10.99	12.18		$3.28
20090817	312	323	322	321.75	311.75	413.00	9.88	9.06	10.66		$3.22
20090818	319	323	323	322.50	311.75	413.00	10.62	8.94	9.66		$3.23
20090819	320	329	328	327.50	311.75	413.00	15.56	12.02	10.01		$3.28
20090820	323	328	324	324.00	311.75	413.00	12.10	12.76	11.24		$3.24
20090821	322	332	326	326.25	311.75	413.00	14.32	13.99	12.92		$3.26
20090824	330	336	336	335.50	311.75	413.00	23.46	16.63	14.46		$3.36
20090825	323	338	327	326.75	311.75	413.00	14.81	17.53	16.05		$3.27
20090826	324	329	326	326.25	311.75	413.00	14.32	17.53	17.23		$3.26
20090827	321	330	329	329.25	311.75	413.00	17.28	15.47	16.84		$3.29
20090828	325	332	329	329.00	311.75	413.00	17.04	16.21	16.41		$3.29
20090831	320	331	330	329.75	311.75	413.00	17.78	17.37	16.35		$3.30
20090901	317	326	319	319.25	311.75	413.00	7.41	14.07	15.88		$3.19
20090902	316	320	319	319.25	311.75	413.00	7.41	10.86	14.10		$3.19
20090903	312	320	316	315.75	311.50	413.00	4.19	6.33	10.42		$3.16
20090904	306	313	306	306.25	306.00	413.00	0.23	3.94	7.05		$3.06
20090908	305	311	308	307.50	305.25	413.00	2.09	2.17	4.15		$3.08
20090909	306	312	310	309.75	305.25	413.00	4.18	2.17	2.76		$3.10
20090910	310	319	315	315.25	305.25	413.00	9.28	5.18	3.17		$3.15
20090911	309	320	320	319.75	305.25	413.00	13.46	8.97	5.44		$3.20
20090914	316	320	318	317.75	305.25	413.00	11.60	11.45	8.53		$3.18
20090915	323	348	347	346.50	305.25	413.00	38.28	21.11	13.84		$3.47
20090916	325	342	336	336.25	305.25	413.00	28.77	26.22	19.59		$3.36
20090917	323	332	329	329.00	305.25	413.00	22.04	29.70	25.68		$3.29
20090918	317	327	318	318.00	305.25	413.00	11.83	20.88	25.60		$3.18
20090921	311	317	316	316.00	305.25	413.00	9.98	14.62	21.73		$3.16
20090922	317	326	326	325.75	305.25	413.00	19.03	13.61	16.37		$3.26
20090923	319	335	330	330.25	305.25	413.00	23.20	17.40	15.21		$3.30
20090924	323	338	337	336.50	305.25	413.00	29.00	23.74	18.25		$3.37
20090925	329	341	334	334.00	305.25	413.00	26.68	26.30	22.48		$3.34
20090928	332	340	339	338.75	306.00	413.00	30.61	28.76	26.27		$3.39
20090929	337	346	341	341.00	309.00	413.00	30.77	29.35	28.14		$3.41
20090930	336	344	344	344.00	309.00	413.00	33.65	31.68	29.93		

				STOCHASTIC							
Date	Low	High	Close	Last close	Lowest low	Highest high		%K	%L	Sell	Buy
20091001	338	346	341	340.50	310.50	413.00	29.27	31.23	30.75		
20091002	332	340	334	333.50	310.50	413.00	22.44	28.45	30.45		
20091005	331	350	342	341.50	310.50	413.00	30.24	27.32	29.00		$3.42
20091006	356	370	358	358.25	310.50	413.00	46.59	33.09	29.62		
20091007	354	364	360	359.75	310.50	413.00	48.05	41.63	34.01		
20091008	362	370	364	364.00	310.50	413.00	52.20	48.94	41.22		
20091009	359	373	362	362.25	316.75	413.00	47.27	49.17	46.58		
20091012	372	384	381	381.25	319.25	413.00	66.13	55.20	51.11		
20091013	375	386	382	381.75	323.00	413.00	65.28	59.56	54.64		
20091014	378	389	383	383.00	328.75	413.00	64.39	65.27	60.01		
20091015	369	378	373	373.00	330.50	413.00	51.52	60.39	61.74		
20091016	369	375	372	372.00	330.50	413.00	50.30	55.40	60.36		
20091019	376	388	386	386.25	330.50	413.00	67.58	56.46	57.42		
20091020	380	388	385	384.50	330.50	413.00	65.45	61.11	57.66		
20091021	387	404	398	398.25	330.50	413.00	82.12	71.72	63.10		
20091022	395	405	404	403.50	330.50	413.00	88.48	78.69	70.51	$4.04	
20091023	395	413	398	397.75	354.25	413.00	74.04	81.55	77.32	$3.98	
20091026	377	400	378	378.00	354.25	413.00	40.43	67.65	75.96		
20091027	370	379	371	370.75	359.00	413.00	21.76	45.41	64.87		
20091028	365	372	369	369.00	359.00	413.00	18.52	26.90	46.65		
20091029	373	382	380	379.50	365.25	413.00	29.84	23.37	31.89		
20091030	364	374	366	366.00	364.00	413.00	4.08	17.48	22.59		$3.66
20091102	367	384	382	382.25	364.00	413.00	37.24	23.72	21.53		$3.82
20091103	376	396	390	390.00	364.00	413.00	53.06	31.46	24.22		
20091104	384	399	384	384.00	364.00	413.00	40.82	43.71	32.96		
20091105	376	386	377	376.50	364.00	413.00	25.51	39.80	38.32		
20091106	366	373	367	367.00	364.00	413.00	6.12	24.15	35.88		
20091109	369	388	386	386.00	364.00	413.00	44.90	25.51	29.82		$3.86
20091110	381	397	395	394.50	364.00	413.00	62.24	37.76	29.14		
20091111	392	403	394	394.00	364.00	413.00	61.22	56.12	39.80		
20091112	385	398	391	390.50	364.00	409.00	58.89	60.79	51.55		
20091113	386	394	391	390.50	364.00	409.00	58.89	59.67	58.86		
20091116	396	403	402	402.25	364.00	409.00	85.00	67.59	62.68		
20091117	397	404	402	402.00	364.00	409.00	84.44	76.11	67.79		
20091118	398	409	398	398.00	364.00	409.00	75.56	81.67	75.12	$3.98	
20091119	391	400	395	395.00	366.00	409.00	67.44	75.81	77.86	$3.95	
20091120	389	395	391	391.00	366.00	409.00	58.14	67.05	74.84		
20091123	385	403	387	387.25	366.00	409.00	49.42	58.33	67.06		
20091124	375	383	376	376.00	366.00	409.00	23.26	43.60	56.33		
20091125	382	394	392	392.00	366.00	409.00	60.47	44.38	48.77		
20091127	383	398	397	397.25	369.25	409.00	70.44	51.39	46.46		
20091130	392	405	403	402.75	375.00	409.00	81.62	70.84	55.54		
20091201	398	406	400	399.75	375.00	409.00	72.79	74.95	65.73		
20091202	390	398	392	391.75	375.00	409.00	49.26	67.89	71.23		
20091203	385	392	385	385.25	375.00	409.00	30.15	50.74	64.53		
20091204	374	385	374	373.75	373.50	409.00	0.70	26.71	48.44		
20091207	368	374	369	368.75	367.50	409.00	3.01	11.29	29.58		$3.69
20091208	368	371	370	369.50	367.50	409.00	4.82	2.85	13.61		$3.70
20091209	364	373	368	368.00	364.00	405.50	9.64	5.82	6.65		$3.68
20091210	366	380	377	377.25	364.00	405.50	31.93	15.46	8.04		$3.77
20091211	375	391	389	389.25	364.00	405.50	60.84	34.14	18.47		
20091214	388	395	392	392.00	364.00	405.50	67.47	53.41	34.34		

Source: CME Group (2011)

6.4.2.2 Returns achieved from application of stochastic oscillator

By applying the fast stochastic and slow stochastic to the CBOT December 2009 corn futures contract, an average buy signal of $3.67/bushel is obtained, while the average sell signal realises a return of $4.43/bushel.

The buy and sell signals are illustrated in Figure 6.2. The red circles indicate a fast and slow stochastic in excess of 70, which represents a sell signal. The green circles indicate a fast and slow stochastic of less than 30 which represents a buy signal.

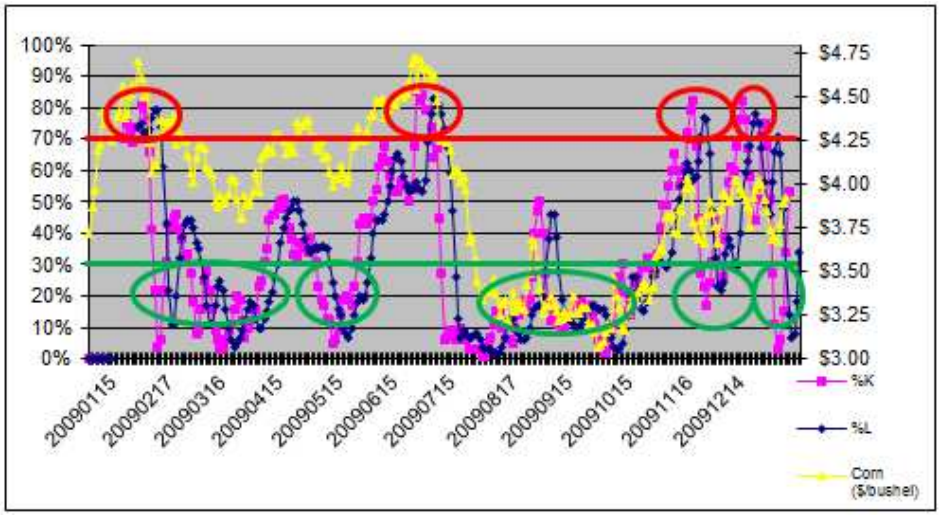

Figure 6.2 Graphical illustration of stochastic signals on CBOT December 2009 corn futures prices

Source: CME Group (2011)

6.4.3 Moving average

The moving average, both in its simplest form or as part of a more complex series of price averages, is one of the most versatile and widely used technical indicators in the modern-day derivatives market. Even though the moving average does not conform to a pure technical oscillator, it forms the basis for many trend-following systems and methodologies. The popularity of the moving average among investors and traders can be attributed to the simplistic underlying mathematics as well as the high level of objectivity in the trading signals provided. Whereas a specific price formation on a chart may result in various contrasting observations from technical analysts, the price trend provided by the simple moving average is undisputed.

6.4.3.1 Definition of moving average

Murphy (1999) defines a moving average as an average of a certain body of data. It is referred to as being a moving indicator, since the body of data to be averaged moves forward with each trading day, while the oldest unit of data is omitted from the calculation in order to allow for the addition of one new unit of data in the determination of the average. Kleinman (2005) defines the moving average as a lagging trend-following tool with the objective of determining the direction of the current trend and identifying when the trend has turned. According to the trading range break rules provided by Brock et al. (1992), the moving average conforms to a momentum-type strategy.

While oscillators such as the RSI and stochastic are designed with the objective of picking tops and bottoms in the price range for a specific market, the moving average is lagging in its forecast and it will therefore never be able to provide the trader with a buy signal on the price low or a sell signal on the price high. In practice, this entails that a moving average never anticipates price movement, but rather reacts to varying prices. Notwithstanding this, market participants will still be able to exploit price movement when the trend is forecasted accurately even though the price may not be trading at extreme levels upon entering into a trade (Kleinman 2005).

6.4.3.2 Variations of the moving average

According to Murphy (1999), different variations of the moving average are applied by professionals in trend identification. These include:

- Simple moving average

  Also known as the arithmetic mean, the simple moving average gives equal weight to each unit under consideration. In a 10-day moving average, each day is assigned a 10% weighting while a 5-day moving average results in a 20% weighting. The simple moving average is calculated as: SMA = (P1 + P2 + P3 + …. + PN)/N

  where P = Price of asset being averaged

  N = Number of units in the moving average

- Linearly weighted moving average

  In order to adjust for potential problems as a result of equal weighting, more weight is given to more recent closings. For example, in a 10-day average, the closing price of

the 10th day would be multiplied by 10, the 9th day by 9, etc. The total is then divided by the sum of the multipliers.

- Exponentially smoothed moving average
  A greater weight is assigned to more recent data, but while less importance is assigned to past price units the calculation still includes all of the data in the life of the instrument in the calculation of the average. The user has the added benefit of deciding which weight should be allocated to the most recent day's price.

6.4.3.3 Determining price trends

The simple moving average is most commonly used by technicians. Once the closing price moves higher than the moving average, an upward price trend is identified and a buy signal generated. A sell signal is provided when the closing price is lower than the moving average (Murphy 1999).

Brock et al. (1992) make use of multiple simple moving averages in the determination of a price trend. The relevant moving averages differ with regards to the number of days involved in the averaging calculation. For the period over which the short-term average exceeds the long-term average, a buy signal is generated. A sell signal is provided for the period over which the long-term average exceeds the short-term average. This technique is known as the double crossover method and lags the market even more than the simple moving average, but in turn allows for fewer cases of whipsaws (Murphy 1999; Kleinman 2005).

As the objective of the current study was to achieve returns superior to those offered by the market, it is important to engage in price risk management strategies which do not lag the market but rather anticipate future price movement. Since the moving average reacts to prices instead of anticipating future price movement, it will be applied with a variation in the proposed methodology. The obvious trend following an upward channel is downward, and a downward trend is followed by an upward price channel. Therefore, a buy signal will be given during a downward trend in anticipation of higher future prices while a sell signal will be given during an upward trend in anticipation of lower prices. It remains the prerogative of the researcher to determine the most suitable length for the moving averages to be applied.

6.4.3.4 Application of double crossover moving averages on historical data

The working of the double crossover moving averages will be illustrated by applying the formula to historical corn price data (see Table 6.3). For the purposes of this example, the December 2009 CBOT corn price will be investigated. The simple moving averages to be applied will be limited to a 9-day and 21-day simple moving average.

Table 6.3 Application of double crossover moving averages on CBOT December 2009 corn futures prices

		MOVING AVERAGES			
Date	c/Bushel	9-day	21-day	Sell	Buy
20081203	394				
20081204	379				
20081205	351				
20081208	374				
20081209	372				
20081210	387				
20081211	397				
20081212	420				
20081215	423	$3.89			
20081216	442	$3.94			
20081217	435	$4.00			
20081218	435	$4.09			
20081219	425	$4.15			
20081222	427	$4.21			
20081223	440	$4.27			
20081224	442	$4.32			
20081226	457	$4.36			
20081229	438	$4.38			
20081230	441	$4.38			
20081231	452	$4.39			
20090102	456	$4.42	$4.18	$4.56	
20090105	455	$4.45	$4.21	$4.55	
20090106	471	$4.50	$4.26	$4.71	
20090107	461	$4.52	$4.31	$4.61	
20090108	450	$4.53	$4.34	$4.50	
20090109	454	$4.53	$4.38	$4.54	
20090112	424	$4.52	$4.40	$4.24	
20090113	407	$4.48	$4.41	$4.07	
20090114	412	$4.43	$4.40	$4.12	
20090115	411	$4.38	$4.40		$4.11
20090116	437	$4.36	$4.39		$4.37
20090120	430	$4.32	$4.39		$4.30
20090121	436	$4.29	$4.39		$4.36
20090122	434	$4.27	$4.40		$4.34
20090123	436	$4.25	$4.40		$4.36
20090126	439	$4.27	$4.40		$4.39
20090127	423	$4.29	$4.39		$4.23
20090128	430	$4.31	$4.38		$4.30
20090129	427	$4.32	$4.37		$4.27
20090130	425	$4.31	$4.37		$4.25

		MOVING AVERAGES			
Date	c/Bushel	9-day	21-day	Sell	Buy
20090202	416	$4.30	$4.35		$4.16
20090203	406	$4.26	$4.33		$4.06
20090204	402	$4.23	$4.30		$4.02
20090205	415	$4.20	$4.27		$4.15
20090206	422	$4.18	$4.26		$4.22
20090209	422	$4.18	$4.24		$4.22
20090210	421	$4.17	$4.23		$4.21
20090211	410	$4.15	$4.22		$4.10
20090212	408	$4.13	$4.22		$4.08
20090213	406	$4.12	$4.22		$4.06
20090217	390	$4.11	$4.21		$3.90
20090218	388	$4.09	$4.18		$3.88
20090219	394	$4.07	$4.17		$3.94
20090220	390	$4.03	$4.14		$3.90
20090223	392	$4.00	$4.12		$3.92
20090224	394	$3.97	$4.10		$3.94
20090225	404	$3.96	$4.09		$4.04
20090226	402	$3.95	$4.08		$4.02
20090227	391	$3.94	$4.06		$3.91
20090302	380	$3.93	$4.04		$3.80
20090303	381	$3.92	$4.02		$3.81
20090304	394	$3.92	$4.00		$3.94
20090305	388	$3.92	$4.00		$3.88
20090306	391	$3.92	$3.99		$3.91
20090309	396	$3.92	$3.98		$3.96
20090310	407	$3.92	$3.97		$4.07
20090311	396	$3.91	$3.96		$3.96
20090312	416	$3.94	$3.96		$4.16
20090313	418	$3.98	$3.96	$4.18	
20090316	421	$4.03	$3.97	$4.21	
20090317	421	$4.06	$3.98	$4.21	
20090318	419	$4.09	$3.99	$4.19	
20090319	428	$4.14	$4.01	$4.28	
20090320	428	$4.17	$4.03	$4.28	
20090323	427	$4.19	$4.04	$4.27	
20090324	425	$4.23	$4.06	$4.25	
20090325	418	$4.23	$4.07	$4.18	
20090326	423	$4.23	$4.08	$4.23	
20090327	419	$4.23	$4.09	$4.19	
20090330	418	$4.23	$4.10	$4.18	
20090331	436	$4.25	$4.13	$4.36	
20090401	427	$4.25	$4.15	$4.27	
20090402	434	$4.25	$4.17	$4.34	
20090403	436	$4.26	$4.19	$4.36	
20090406	437	$4.27	$4.21	$4.37	
20090407	428	$4.29	$4.23	$4.28	
20090408	428	$4.29	$4.24	$4.28	
20090409	422	$4.29	$4.25	$4.22	
20090413	419	$4.29	$4.25	$4.19	
20090414	425	$4.28	$4.26	$4.25	
20090415	415	$4.27	$4.25	$4.15	

		MOVING AVERAGES			
Date	c/Bushel	9-day	21-day	Sell	Buy
20090416	417	$4.25	$4.25		$4.17
20090417	407	$4.22	$4.25		$4.07
20090420	399	$4.18	$4.23		$3.99
20090421	404	$4.15	$4.22		$4.04
20090422	403	$4.12	$4.21		$4.03
20090423	412	$4.11	$4.20		$4.12
20090424	407	$4.10	$4.20		$4.07
20090427	402	$4.07	$4.19		$4.02
20090428	404	$4.06	$4.18		$4.04
20090429	422	$4.06	$4.18		$4.22
20090430	423	$4.08	$4.18		$4.23
20090501	433	$4.12	$4.18		$4.33
20090504	426	$4.15	$4.17		$4.26
20090505	425	$4.17	$4.17	$4.25	
20090506	427	$4.19	$4.16	$4.27	
20090507	431	$4.21	$4.17	$4.31	
20090508	440	$4.26	$4.17	$4.40	
20090511	440	$4.30	$4.18	$4.40	
20090512	448	$4.33	$4.19	$4.48	
20090513	447	$4.35	$4.20	$4.47	
20090514	449	$4.37	$4.22	$4.49	
20090515	439	$4.38	$4.23	$4.39	
20090518	442	$4.40	$4.25	$4.42	
20090519	447	$4.43	$4.27	$4.47	
20090520	447	$4.44	$4.29	$4.47	
20090521	446	$4.45	$4.31	$4.46	
20090522	452	$4.46	$4.33	$4.52	
20090526	450	$4.47	$4.35	$4.50	
20090527	450	$4.47	$4.38	$4.50	
20090528	452	$4.47	$4.40	$4.52	
20090529	459	$4.49	$4.42	$4.59	
20090601	469	$4.53	$4.44	$4.69	
20090602	473	$4.55	$4.46	$4.73	
20090603	455	$4.56	$4.47	$4.55	
20090604	472	$4.59	$4.49	$4.72	
20090605	468	$4.61	$4.51	$4.68	
20090608	458	$4.62	$4.52	$4.58	
20090609	466	$4.64	$4.54	$4.66	
20090610	458	$4.64	$4.55	$4.58	
20090611	463	$4.65	$4.55	$4.63	
20090612	448	$4.62	$4.55	$4.48	
20090615	428	$4.57	$4.54	$4.28	
20090616	425	$4.54	$4.54	$4.25	
20090617	429	$4.49	$4.53		$4.29
20090618	424	$4.44	$4.52		$4.24
20090619	420	$4.40	$4.51		$4.20
20090622	406	$4.33	$4.49		$4.06
20090623	409	$4.28	$4.47		$4.09
20090624	407	$4.22	$4.45		$4.07
20090625	402	$4.16	$4.42		$4.02
20090626	404	$4.14	$4.40		$4.04

		MOVING AVERAGES			
Date	c/Bushel	9-day	21-day	Sell	Buy
20090629	397	$4.11	$4.37		$3.97
20090630	367	$4.04	$4.32		$3.67
20090701	369	$3.98	$4.27		$3.69
20090702	358	$3.91	$4.23		$3.58
20090706	344	$3.84	$4.17		$3.44
20090707	336	$3.76	$4.10		$3.36
20090708	334	$3.68	$4.04		$3.34
20090709	340	$3.61	$3.98		$3.40
20090710	338	$3.54	$3.93		$3.38
20090713	340	$3.47	$3.87		$3.40
20090714	346	$3.45	$3.82		$3.46
20090715	338	$3.41	$3.78		$3.38
20090716	325	$3.38	$3.73		$3.25
20090717	332	$3.36	$3.68		$3.32
20090720	334	$3.36	$3.64		$3.34
20090721	322	$3.35	$3.59		$3.22
20090722	319	$3.32	$3.55		$3.19
20090723	339	$3.33	$3.52		$3.39
20090724	327	$3.31	$3.48		$3.27
20090727	334	$3.30	$3.45		$3.34
20090728	330	$3.29	$3.41		$3.30
20090729	328	$3.29	$3.38		$3.28
20090730	342	$3.31	$3.37		$3.42
20090731	350	$3.32	$3.36		$3.50
20090803	369	$3.38	$3.36	$3.69	
20090804	366	$3.43	$3.37	$3.66	
20090805	357	$3.45	$3.38	$3.57	
20090806	340	$3.46	$3.39	$3.40	
20090807	327	$3.45	$3.38	$3.27	
20090810	331	$3.45	$3.38	$3.31	
20090811	331	$3.46	$3.37	$3.31	
20090812	336	$3.45	$3.37	$3.36	
20090813	332	$3.43	$3.37	$3.32	
20090814	328	$3.39	$3.37	$3.28	
20090817	322	$3.34	$3.36		$3.22
20090818	323	$3.30	$3.36		$3.23
20090819	328	$3.28	$3.36		$3.28
20090820	324	$3.28	$3.36		$3.24
20090821	326	$3.28	$3.36		$3.26
20090824	336	$3.28	$3.36		$3.36
20090825	327	$3.27	$3.36		$3.27
20090826	326	$3.26	$3.36		$3.26
20090827	329	$3.27	$3.36		$3.29
20090828	329	$3.27	$3.35		$3.29
20090831	330	$3.28	$3.34		$3.30
20090901	319	$3.27	$3.32		$3.19
20090902	319	$3.27	$3.29		$3.19
20090903	316	$3.26	$3.27		$3.16
20090904	306	$3.22	$3.26		$3.06
20090908	308	$3.20	$3.25		$3.08
20090909	310	$3.18	$3.24		$3.10

		MOVING AVERAGES			
Date	c/Bushel	9-day	21-day	Sell	Buy
20090910	315	$3.17	$3.23		$3.15
20090911	320	$3.16	$3.22		$3.20
20090914	318	$3.15	$3.22		$3.18
20090915	347	$3.18	$3.23		$3.47
20090916	336	$3.19	$3.23		$3.36
20090917	329	$3.21	$3.24		$3.29
20090918	318	$3.22	$3.23		$3.18
20090921	316	$3.23	$3.23	$3.16	
20090922	326	$3.25	$3.23	$3.26	
20090923	330	$3.27	$3.23	$3.30	
20090924	337	$3.28	$3.23	$3.37	
20090925	334	$3.30	$3.23	$3.34	
20090928	339	$3.29	$3.24	$3.39	
20090929	341	$3.30	$3.24	$3.41	
20090930	344	$3.32	$3.25	$3.44	
20091001	341	$3.34	$3.26	$3.41	
20091002	334	$3.36	$3.27	$3.34	
20091005	342	$3.38	$3.28	$3.42	
20091006	358	$3.41	$3.30	$3.58	
20091007	360	$3.43	$3.33	$3.60	
20091008	364	$3.47	$3.36	$3.64	
20091009	362	$3.49	$3.38	$3.62	
20091012	381	$3.54	$3.41	$3.81	
20091013	382	$3.58	$3.44	$3.82	
20091014	383	$3.63	$3.45	$3.83	
20091015	373	$3.67	$3.47	$3.73	
20091016	372	$3.71	$3.49	$3.72	
20091019	386	$3.74	$3.53	$3.86	
20091020	385	$3.76	$3.56	$3.85	
20091021	398	$3.80	$3.59	$3.98	
20091022	404	$3.85	$3.63	$4.04	
20091023	398	$3.87	$3.66	$3.98	
20091026	378	$3.86	$3.68	$3.78	
20091027	371	$3.85	$3.69	$3.71	
20091028	369	$3.84	$3.71	$3.69	
20091029	380	$3.85	$3.72	$3.80	
20091030	366	$3.83	$3.74	$3.66	
20091102	382	$3.83	$3.76	$3.82	
20091103	390	$3.82	$3.78	$3.90	
20091104	384	$3.80	$3.79	$3.84	
20091105	377	$3.77	$3.80		$3.77
20091106	367	$3.76	$3.80		$3.67
20091109	386	$3.78	$3.81		$3.86
20091110	395	$3.81	$3.82		$3.95
20091111	394	$3.82	$3.83		$3.94
20091112	391	$3.85	$3.83	$3.91	
20091113	391	$3.86	$3.84	$3.91	
20091116	402	$3.87	$3.85	$4.02	
20091117	402	$3.89	$3.86	$4.02	
20091118	398	$3.92	$3.87	$3.98	

Date	c/Bushel	MOVING AVERAGES 9-day	21-day	Sell	Buy
20091119	395	$3.95	$3.87	$3.95	
20091120	391	$3.95	$3.86	$3.91	
20091123	387	$3.95	$3.85	$3.87	
20091124	376	$3.93	$3.85	$3.76	
20091125	392	$3.93	$3.86	$3.92	
20091127	397	$3.93	$3.88	$3.97	
20091130	403	$3.93	$3.89	$4.03	
20091201	400	$3.93	$3.90	$4.00	
20091202	392	$3.93	$3.91	$3.92	
20091203	385	$3.91	$3.91	$3.85	
20091204	374	$3.90	$3.90		$3.74
20091207	369	$3.87	$3.90		$3.69
20091208	370	$3.87	$3.90		$3.70
20091209	368	$3.84	$3.89		$3.68
20091210	377	$3.82	$3.88		$3.77
20091211	389	$3.80	$3.88		$3.89
20091214	392	$3.80	$3.88		$3.92

Source: CME Group (2011)

6.4.3.5 Returns achieved from application of double crossover moving averages

By applying the 9-day and 21-day moving averages to the CBOT December 2009 corn futures contract in a manner as described in section 6.4.3.3, an average buy signal of $3.76/bushel is obtained, while the average sell signal realises a return of $4.05/bushel.

The buy and sell signals are illustrated in Figure 6.3. The red circles indicate a sell signal while the green circles represent a buy signal.

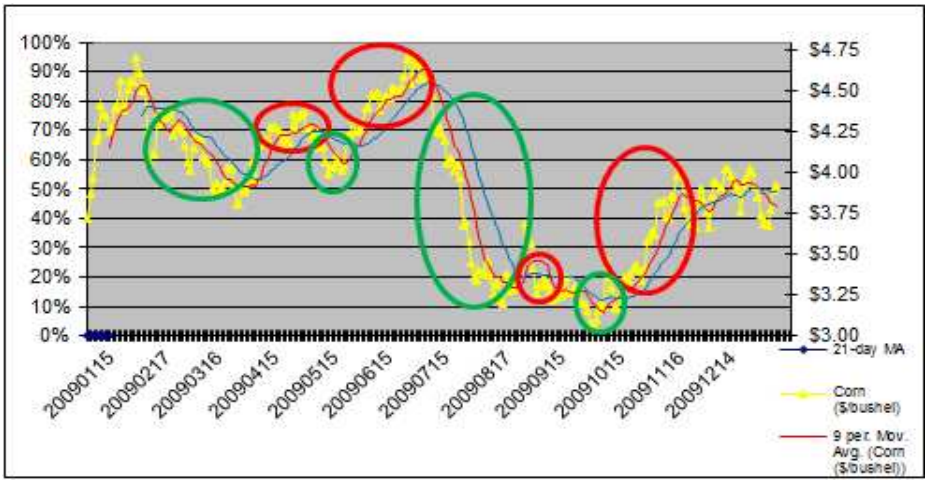

Figure 6.3 Graphical illustration of double crossover moving average on CBOT December 2009 corn futures prices

Source: CME Group (2011)

6.4.4 Combination of technical indicators

The development of a technical trading system or methodology is part art, part science and a whole lot of common sense. The objective of the development of such a system is not necessarily to obtain the highest returns from using historical price data, but rather to formulate a concept, which can be empirically proven to have performed reasonably well in the past with the expectation that the above-average returns achieved will continue into the future. By combining the RSI, stochastic indicator and double crossover moving average into one formulation the analyst is able to interpret trading signals from three different mathematical models simultaneously. A stronger case can be argued for entering into a trade when all indicators confirm similar trading signals.

6.4.4.1 Application of combination signals on historical price data

The working of the combination of technical indicators will be illustrated by applying the formulas to historical corn price data (see Table 6.4). For the purposes of this example, the December 2009 CBOT corn price will be investigated.

Table 6.4 Application of combination technical indicators on CBOT December 2009 corn futures prices

Date	CBOT (c/bu)	Stochastics		RSI	Moving averages		Sell	Buy
					9-day	21-day		
20081204	379							
20081205	351							
20081208	374							
20081209	372							
20081210	387							
20081211	397							
20081212	420							
20081215	423				388.56			
20081216	442				393.81			
20081217	435				400.03			
20081218	435				409.31			
20081219	425				415.00			
20081222	427				421.08			
20081223	440				426.92			
20081224	442	87.05		70.1783	431.92			
20081226	457	94.03		73.0053	435.97			
20081229	438	88.03	89.70	64.9393	437.72			
20081230	441	81.42	87.83	65.5016	437.64			
20081231	452	76.54	82.00	67.8866	439.44			
20090102	456	82.35	80.11	68.9093	441.83	418.33		
20090105	455	84.88	81.26	68.4153	445.19	421.24		
20090106	471	89.98	85.74	71.8880	450.11	425.62	$4.71	
20090107	461	86.16	87.01	66.5905	452.42	430.82		
20090108	450	79.07	85.07	61.9061	453.39	434.46		

Date	CBOT (c/bu)	Stochastics		RSI	Moving averages		Sell	Buy
					9-day	21-day		
20090109	454	68.12	77.78	63.0000	453.14	438.37		
20090112	424	42.56	63.25	51.1394	451.58	440.13		
20090113	407	22.65	44.44	45.8001	447.83	440.63		
20090114	412	3.91	23.04	47.3446	443.39	440.23		
20090115	411	6.46	11.01	47.1837	438.36	439.68		
20090116	437	22.76	11.04	55.5593	436.31	439.45		
20090120	430	31.97	20.39	53.1787	431.72	439.20		
20090121	436	44.28	33.00	54.9495	428.97	439.25		
20090122	434	42.66	39.64	54.0875	427.11	439.65		
20090123	436	45.65	44.20	54.9335	425.08	440.08		
20090126	439	47.26	45.19	55.9817	426.72	440.05		
20090127	423	43.29	45.40	49.3844	428.50	439.17		
20090128	430	43.07	44.54	52.0470	430.56	437.90		
20090129	427	39.69	42.02	50.9139	432.36	437.38		
20090130	425	45.13	42.63	49.9556	431.06	436.63		
20090202	416	38.59	41.14	46.2091	429.50	434.94		
20090203	406	28.08	37.27	42.4913	426.22	432.56		
20090204	402	12.37	26.35	40.8574	422.69	430.01		
20090205	415	13.42	17.96	47.3928	420.39	427.35		
20090206	422	24.82	16.87	50.2438	418.47	425.50		
20090209	422	39.98	26.07	50.2438	418.33	424.14		
20090210	421	44.41	36.40	49.6437	417.28	422.54		
20090211	410	36.17	40.19	44.8035	415.36	421.86		
20090212	408	25.57	35.38	43.8176	413.44	421.89		
20090213	406	15.55	25.76	42.8033	412.28	421.61		
20090217	390	10.88	17.33	36.6164	410.50	420.62		
20090218	388	7.28	11.24	35.6166	408.92	418.27		
20090219	394	8.78	8.98	39.6497	406.53	416.55		
20090220	390	12.78	9.62	38.0087	402.97	414.36		
20090223	392	18.72	13.43	39.1944	399.61	412.36		
20090224	394	21.97	17.82	41.1008	396.69	410.37		
20090225	404	32.40	24.37	47.2534	396.00	408.69		
20090226	402	40.41	31.60	46.4288	395.39	407.70		
20090227	391	37.99	36.93	40.6926	393.78	405.85		
20090302	380	25.09	34.49	36.1027	392.67	403.61		
20090303	381	14.03	25.70	36.4617	391.92	401.50		
20090304	394	21.81	20.31	45.0982	391.92	400.44		
20090305	388	30.26	22.03	42.2441	391.69	399.56		
20090306	391	40.97	31.01	44.1474	391.61	399.04		
20090309	396	46.29	39.17	47.4133	391.81	398.12		
20090310	407	62.69	49.98	53.4195	392.14	397.40		
20090311	396	66.43	58.47	47.5685	391.44	396.18		
20090312	416	78.57	69.23	56.9070	394.19	395.95		
20090313	418	82.98	75.99	57.8285	398.39	396.33		
20090316	421	94.27	85.27	59.1862	402.89	396.98		
20090317	421	91.75	89.67	58.8722	405.89	397.70		
20090318	419	87.32	91.11	57.5567	409.33	399.06		
20090319	428	87.62	88.90	61.9103	413.50	401.00		
20090320	428	87.93	87.62	61.7309	417.06	402.63		
20090323	427	88.10	87.88	61.1582	419.33	404.42		
20090324	425	84.95	87.00	59.5710	422.58	406.02		
20090325	418	75.95	83.00	53.7499	422.78	407.13		
20090326	423	71.07	77.32	56.8275	423.31	408.04		
20090327	419	64.62	70.55	54.2364	423.08	408.85		
20090330	418	63.50	66.40	53.4860	422.81	410.14		
20090331	436	72.52	66.88	63.1060	424.69	412.79		

Date	CBOT (c/bu)	Stochastics		RSI	Moving averages		Sell	Buy
					9-day	21-day		
20090401	427	72.84	69.62	56.9455	424.58	415.00		
20090402	434	81.75	75.70	60.1493	425.22	416.90		
20090403	436	80.09	78.23	60.9909	426.14	419.18		
20090406	437	91.67	84.50	61.6145	427.42	421.37		
20090407	428	83.65	85.14	54.6520	428.53	422.87		
20090408	428	73.72	83.01	54.8007	429.08	423.87		
20090409	422	54.49	70.62	50.5202	429.36	425.10		
20090413	419	43.91	57.37	48.8094	429.47	425.26		
20090414	425	40.06	46.15	52.6113	428.25	425.58		
20090415	415	31.73	38.57	46.2252	426.92	425.30		
20090416	417	28.53	33.44	47.3127	425.03	425.11		
20090417	407	12.08	24.11	41.4456	421.86	424.55		
20090420	399	13.12	17.91	37.2378	417.64	423.14		
20090421	404	15.61	13.60	40.9548	414.97	421.98		
20090422	403	24.11	17.61	40.8178	412.25	420.83		
20090423	412	33.32	24.35	47.1065	411.11	420.18		
20090424	407	35.75	31.06	44.1947	409.72	419.67		
20090427	402	34.85	34.64	41.1659	407.14	418.65		
20090428	404	29.98	33.53	43.3557	405.92	417.94		
20090429	422	41.48	35.44	54.8681	406.47	418.11		
20090430	423	62.25	44.57	55.6992	408.28	417.51		
20090501	433	84.45	62.73	60.8723	412.11	417.80		
20090504	426	87.82	78.17	55.4665	414.56	417.40		
20090505	425	85.04	85.77	55.1264	416.97	416.90		
20090506	427	80.11	84.32	56.1402	418.67	416.43		
20090507	431	81.72	82.29	58.5871	421.36	416.60		
20090508	440	88.73	83.52	63.1458	425.61	417.17		
20090511	440	94.42	88.29	63.3938	429.61	418.05		
20090512	448	98.39	93.84	67.0901	432.53	419.42		
20090513	447	94.70	95.83	66.3914	435.19	420.49		
20090514	449	92.16	95.08	67.3673	436.97	422.11		
20090515	439	83.78	90.21	57.6733	438.42	423.14		
20090518	442	79.01	84.98	59.7063	440.31	424.81		
20090519	447	75.64	79.48	62.4789	442.56	427.11		
20090520	447	77.77	77.47	62.6174	444.36	429.19		
20090521	446	77.45	76.95	60.9221	445.00	431.20		
20090522	452	80.13	78.45	64.7406	446.31	433.13		
20090526	450	81.80	79.79	62.9569	446.56	435.20		
20090527	450	83.33	81.75	62.4277	446.83	437.50		
20090528	452	79.61	81.58	64.0547	447.17	439.79		
20090529	459	84.49	82.48	68.2062	449.47	441.57		
20090601	469	92.16	85.42	73.0031	452.50	443.76	$4.69	
20090602	473	99.10	91.92	74.4557	455.36	445.64	$4.73	
20090603	455	85.02	92.09	57.5447	456.22	447.05		
20090604	472	83.54	89.22	65.4097	459.11	449.26		
20090605	468	79.17	82.58	62.3921	460.83	451.20		
20090608	458	79.46	80.72	55.8072	461.69	452.49		
20090609	466	74.09	77.57	59.7773	463.53	453.75		
20090610	458	63.97	72.51	54.5042	464.17	454.60		
20090611	463	67.07	68.38	57.0978	464.61	455.32		
20090612	448	45.40	58.81	48.3365	462.22	455.35		
20090615	428	27.13	46.53	39.8415	457.22	454.32		
20090616	425	6.09	26.21	38.9207	453.92	453.69		
20090617	429	6.94	13.39	40.9774	449.17	453.06		
20090618	424	9.37	7.47	38.9592	444.31	451.95		
20090619	420	9.29	8.53	37.2785	440.03	450.63		

Date	CBOT (c/bu)	Stochastics		RSI	Moving averages		Sell	Buy
					9-day	21-day		
20090622	406	5.75	8.14	32.3307	433.28	448.73		
20090623	409	6.95	7.33	34.6654	427.83	446.68		
20090624	407	9.51	7.40	34.0331	421.61	444.63		
20090625	402	7.63	8.03	31.9699	416.47	442.33		
20090626	404	6.05	7.73	34.0298	413.86	440.05		
20090629	397	3.44	5.71	31.4217	410.75	437.10		
20090630	367	2.97	4.15	23.2113	403.92	432.24		$3.67
20090701	369	3.05	3.15	24.6253	397.86	427.31		$3.69
20090702	358	2.70	2.91	22.0557	390.97	422.67		$3.58
20090706	344	2.89	2.88	19.5751	384.17	416.61		$3.44
20090707	336	0.66	2.08	18.1637	376.03	410.33		$3.36
20090708	334	1.23	1.59	17.9182	367.92	404.44		$3.34
20090709	340	3.83	1.91	22.2563	361.08	398.43		$3.40
20090710	338	7.40	4.16	21.8243	353.72	392.71		$3.38
20090713	340	11.07	7.43	23.0311	347.31	386.82		$3.40
20090714	346	15.15	11.21	27.8303	344.89	381.95		$3.46
20090715	338	15.07	13.76	25.5434	341.36	377.65		$3.38
20090716	325	10.83	13.69	22.4951	337.78	372.89		$3.25
20090717	332	6.84	10.92	27.2644	336.36	368.26		$3.32
20090720	334	9.05	8.91	28.9592	336.14	363.98		$3.34
20090721	322	9.79	8.56	25.6040	334.78	359.33		$3.22
20090722	319	9.96	9.60	24.8775	332.47	355.23		$3.19
20090723	339	26.52	15.42	38.2557	332.56	351.88		
20090724	327	37.32	24.60	34.3685	331.19	348.07		
20090727	334	52.63	38.82	38.1914	329.89	344.85		
20090728	330	44.59	44.85	36.7719	329.03	341.30		
20090729	328	45.65	47.62	36.1391	329.33	338.00		
20090730	342	53.86	48.03	44.5131	330.53	336.81		
20090731	350	72.23	57.25	48.2324	332.28	335.87		
20090803	369	89.32	71.81	56.6493	337.50	336.42		
20090804	366	90.85	84.13	55.0430	342.67	337.44		
20090805	357	81.27	87.15	50.8615	344.69	338.45		
20090806	340	65.43	79.18	43.9746	346.14	338.74		
20090807	327	43.80	63.50	39.2734	345.33	338.10		
20090810	331	29.20	46.14	41.2414	345.42	337.74		
20090811	331	20.39	31.13	41.4966	345.75	337.33		
20090812	336	22.84	24.14	44.2355	345.08	336.89		
20090813	332	20.42	21.21	42.5009	343.14	336.63		
20090814	328	18.78	20.68	40.7788	338.56	336.75		
20090817	322	15.11	18.10	38.4125	333.67	336.29		
20090818	323	14.49	16.13	38.8898	329.83	335.75		
20090819	328	19.16	16.25	42.1112	328.42	336.01		
20090820	324	20.34	18.00	40.5017	328.14	336.24		
20090821	326	22.72	20.74	42.0355	327.67	335.64		
20090824	336	28.65	23.90	47.9732	328.17	336.04		
20090825	327	34.88	28.75	43.4400	327.11	335.70		
20090826	326	42.58	35.37	43.1889	326.47	335.54		
20090827	329	47.35	41.60	45.2347	326.64	335.60		
20090828	329	53.39	47.77	45.0890	327.44	334.96		
20090831	330	57.18	52.64	45.6546	328.25	334.02		
20090901	319	46.34	52.30	39.5177	327.33	331.65		
20090902	319	37.35	46.96	39.5177	326.81	329.44		
20090903	316	23.29	35.66	37.5656	325.64	327.48		
20090904	306	15.42	25.35	32.8257	322.39	325.86		
20090908	308	8.04	15.58	34.0056	320.25	324.95		
20090909	310	7.24	10.23	36.1787	318.42	323.96		

Date	CBOT (c/bu)	Stochastics		RSI	Moving averages		Sell	Buy
					9-day	21-day		
20090910	315	17.31	10.86	41.2696	316.86	323.21		
20090911	320	29.97	18.18	45.1264	315.83	322.43		
20090914	318	38.24	28.51	43.7512	314.50	321.75		
20090915	347	60.26	42.83	61.7812	317.53	322.64		
20090916	336	69.59	56.03	55.0110	319.42	323.33		
20090917	329	75.29	68.38	50.7729	320.89	323.64		
20090918	318	52.94	65.94	45.0960	322.19	323.19		
20090921	316	37.06	55.10	44.1299	323.14	322.81		
20090922	326	34.51	41.50	49.7785	324.92	322.79		
20090923	330	44.12	38.56	52.1815	326.58	322.54		
20090924	337	60.20	46.27	55.3751	328.44	323.00		
20090925	334	66.67	56.99	53.8266	330.25	323.37		
20090928	339	73.21	66.69	56.3257	329.39	323.82		
20090929	341	76.22	72.03	57.4991	329.92	324.39		
20090930	344	83.78	77.74	59.0779	331.58	325.07		
20091001	341	84.48	81.50	56.4436	334.08	326.08		
20091002	334	77.53	81.93	51.4977	336.03	326.76		
20091005	342	73.59	78.53	56.2193	337.78	327.99		
20091006	358	73.61	74.91	64.0995	340.89	330.46		
20091007	360	80.73	75.97	64.7120	343.47	332.95		
20091008	364	84.54	79.63	66.4583	346.81	335.54		
20091009	362	84.64	83.31	65.0312	349.42	337.77		
20091012	381	89.10	86.10	72.0488	353.89	340.70	$3.81	
20091013	382	90.09	87.94	72.2069	358.08	343.75	$3.82	
20091014	383	93.39	90.86	72.6237	362.81	345.49	$3.83	
20091015	373	85.65	89.71	64.3140	367.19	347.24		
20091016	372	78.54	85.86	63.5311	370.58	349.29		
20091019	386	80.32	81.50	69.2712	373.69	352.54		
20091020	385	86.93	81.93	67.8586	376.44	355.80		
20091021	398	94.01	87.08	72.5884	380.25	359.25	$3.98	
20091022	404	94.63	91.86	74.1524	384.83	362.74	$4.04	
20091023	398	88.28	92.31	69.4768	386.67	365.65		
20091026	378	70.82	84.58	56.3370	386.25	367.75		
20091027	371	45.41	68.17	52.4179	384.89	369.27		
20091028	369	26.90	47.71	51.4869	384.44	370.61		
20091029	380	23.37	31.89	56.4815	385.28	372.30		
20091030	366	17.48	22.59	49.4345	383.03	373.51		
20091102	382	23.72	21.53	56.4741	382.78	375.83		
20091103	390	31.46	24.22	59.3787	381.86	378.14		
20091104	384	43.71	32.96	56.2491	379.69	379.37		
20091105	377	39.80	38.32	52.5227	377.33	380.17		
20091106	367	24.15	35.88	48.1696	376.11	380.31		
20091109	386	25.51	29.82	56.0204	377.81	381.44		
20091110	395	37.76	29.14	59.0116	380.64	382.07		
20091111	394	56.12	39.80	58.7585	382.25	382.65		
20091112	391	64.10	52.66	56.9177	384.97	383.01		
20091113	391	66.30	62.17	56.9177	385.89	383.85		
20091116	402	78.58	69.66	61.6013	387.25	385.29		
20091117	402	87.30	77.39	61.4482	389.25	386.04		
20091118	398	89.54	85.14	58.9254	391.64	386.68		
20091119	395	79.33	85.39	57.0341	394.75	386.52		
20091120	391	67.05	78.64	54.5213	395.31	385.93		
20091123	387	58.33	68.24	52.1995	394.50	385.43		
20091124	376	43.60	56.33	45.8861	392.50	385.33		
20091125	392	44.38	48.77	54.3437	392.67	386.35		
20091127	397	51.39	46.46	56.7332	393.42	387.69		

Date	CBOT (c/bu)	Stochastics		RSI	Moving averages		Sell	Buy
					9-day	21-day		
20091130	403	70.84	55.54	59.1456	393.47	388.80		
20091201	400	74.95	65.73	57.2699	393.22	390.40		
20091202	392	67.89	71.23	52.4896	392.53	390.86		
20091203	385	50.74	64.53	48.9168	391.44	390.63		
20091204	374	26.71	48.44	43.3012	389.53	390.14		
20091207	369	11.29	29.58	41.0924	387.47	389.77		
20091208	370	2.85	13.61	41.5739	386.75	389.89		
20091209	368	5.82	6.65	40.8547	384.08	389.04		
20091210	377	15.46	8.04	46.9491	381.86	388.21		
20091211	389	34.14	18.47	53.6252	380.36	387.99		
20091214	392	53.41	34.34	55.0221	379.50	388.06		

Source: CME Group (2011)

See Appendix I for a detailed summary of the daily CBOT December corn futures closing prices in addition to the calculation of the appropriate technical oscillators.

6.4.4.2 Returns achieved from application of combination technical indicators

By applying the combination technical indicators to the CBOT December 2009 corn futures contract, an average buy signal of $3.40/bushel is obtained, while the average sell signal realises a return of $4.20/bushel.

The buy and sell signals are illustrated in Figure 6.4. The red circles indicate a sell signal while the green circle represents a buy signal.

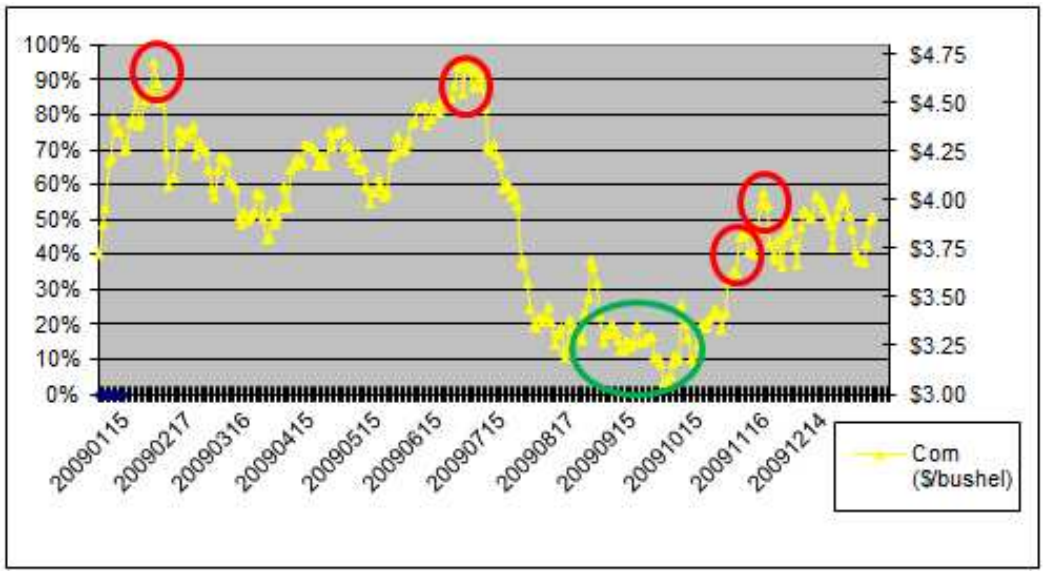

Figure 6.4 Graphical illustration of combination technical indicators on CBOT December 2009 corn futures prices

Source: CME Group (2011)

6.5 SHORTCOMING OF TRADING EXCLUSIVELY THROUGH TECHNICAL ANALYSIS

The financial results obtained by adhering to trading signals as provided by technical indicators justify the use of such analysis in the hedging and speculative methodologies of futures and options traders. Although the success of technical indicators in the forecasting of future price movements is evident in the empirical results obtained, a major shortcoming exists which prevents the derivatives trader from acting on each and every signal provided by oscillators and trend-following indicators.

On an annual basis, the number of buy and/or sell signals observed through technical analysis varies substantially. Figure 6.5 illustrates the magnitude of deviation in the volume of annual trading signals and, importantly, the figure highlights the difference between the number of buy signals and sell signals on an intra-year basis.

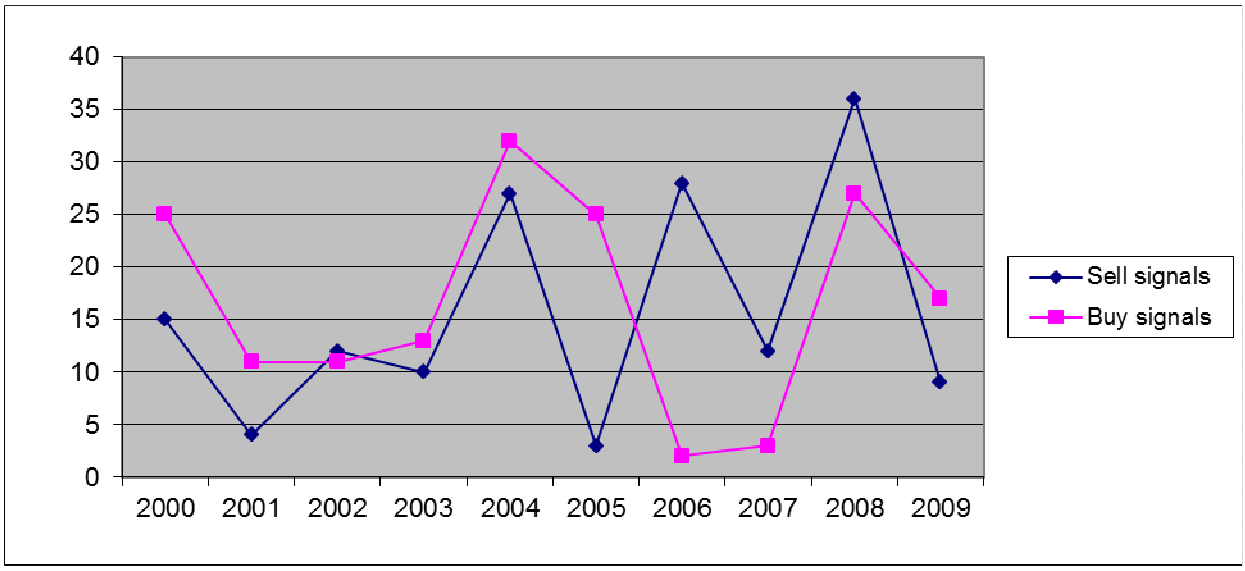

Figure 6.5 Annual trading signals 2000–2009

Source: CME Group (2011)

The uncertainty regarding the number of expected trading signals is problematic in the forward buy or sell of a commodity. A producer wishing to sell a certain volume of corn on an annual basis cannot spread the sale into even increments over the course of the year, since it is impossible to discount the number of sell signals to be expected. Similarly, a processor with the objective of acting on buy signals in order to obtain corn at below-

average prices cannot hedge the total volume of its annual consumption on the first buy signal, since the following signals may occur at substantially lower prices.

It is therefore necessary to include technical indicators in the proposed risk management methodology in a manner whereby extreme prices may be exploited in overbought or oversold conditions over the course of the contract lifetime. This should be implemented, however, through a structure that will allow for the exploitation of signals on a continuous basis without absorbing additional risk on the volumes to be traded.

6.6 SUMMARY AND CONCLUSIONS

Technical analysis is a price-forecasting method which analyses past and current price action by means of charts with the objective of obtaining information regarding future price movements. In the forecasting of prices, oscillators can be used either individually or collectively as a group. Several prominent characteristics distinguish technical analysis from fundamental analysis.

In general, technical analysis has not received the same level of recognition and acceptance by academics as fundamental analysis:

- Technical analysis is visual in nature and implements pattern recognition in the forecasting of prices while fundamental analysis is primarily algebraic and employs mathematical analysis and probability statistics in the valuation of prices.
- Technical traders examine the effect of market movement compared to fundamental traders who study the cause of price fluctuations.
- Lastly, technical oscillators tend to be leading indicators in response to fundamental variables which lag price movements.

The accuracy and success of technical analysts in forecasting future price movements is a controversial and divisive subject with contrasting findings published by researchers. The main objections against technical trading are the belief that futures prices possess no memory and therefore an analysis of past prices will have no effect on future price movement. In addition, academics suggest that transaction costs rule out any possible

financial benefits, and subjectivity relating to the interpretation of charts may lead to distorted trading signals.

In contrast to this, empirical studies identify technical trends in markets, which do not reflect the essence of a true random walk. It has also been suggested that technical analysis, other than fundamental analysis, is not subject to false trend movements based on inaccurate market information. Research has shown that the application of non-parametric statistical techniques may identify price patterns that exhibit predictive power.

Statistical and technical oscillators are indicators which determine when a market is trading in overbought or oversold conditions. They are of extreme importance in non-trending markets which trade in a narrow and limited price range. The oscillators most commonly used by analysts are the relative strength index (RSI) and stochastic indicator. While moving averages are not categorised as oscillators, they remain an essential forecasting tool in markets where prices are in a trending phase.

Chapter 7 will define trends in broad terms and will further distinguish between the three alternative categories of trends observed in futures markets. The CBOT corn futures price and price volatility will be explored with the objective of determining whether trends are in fact present in the CBOT futures market with corn as the underlying asset.

CHAPTER 7
PRICE AND VOLATILITY TRENDS

7.1 INTRODUCTION

Chapter 6 defined technical analysis and its associated oscillators, and also distinguished this phenomenon from the more common analytical method of fundamental analysis. A literature study conducted on the acceptance of technical analysis as price-forecasting mechanism suggested that contradictory views exist among researchers as to the effectiveness by which oscillators can be applied with the objective of predicting market movement. Individual oscillators were applied to historical market prices in order to determine the effectiveness of the oscillators, after which they were used in combination with one another to enhance the already impressive returns achieved individually even further. The shortcomings of charting were discussed, and these will enable researchers to conduct analysis in a manner whereby such drawbacks can be eliminated.

The concept of trends in futures markets is essential for the technical approach to market analysis. Investors evaluate market trends in order to formulate their trading strategies and methodologies, while they also base their buy and sell decisions on trend-based heuristics. This is attributed to trader beliefs that future asset prices are likely to be determined by previous price trends. Therefore, the majority of technical tools and systems are trend-following in nature, meaning that they are primarily designed for markets moving continually up or down. As a result, it is essential to determine the direction of the market trend in order to participate in its movement.

This chapter will define trends in broad terms and distinguish between the three alternative categories of trends observed in futures markets. The focus will also be on the existence of empirical evidence supporting or rejecting the effectiveness of trend analysis in forecasting future price movements. The CBOT corn futures price and price volatility will be explored with the objective of determining whether trends are in fact present in the CBOT futures market with corn as the underlying asset.

7.2 DEFINITION AND CLASSIFICATION

The proposed price risk management methodology will be based on a combination of technical oscillators and market trends. Expressions often used in the economic environment such as “always trade in the direction of the trend”, “never buck the trend” and “the trend is your friend” illustrate the importance of analysing and determining market trends. It is therefore necessary to define the concept of trends clearly and to categorise the alternative versions present in the futures market.

7.2.1 Definition

Murphy (1999) defines a ‘trend’ as the direction of the market, or the way in which the market is moving. According to him, markets generally do not move in a straight line, but are rather characterised by a series of short-term random movements. These short-term movements resemble a series of successive waves with obvious peaks and troughs. The direction of these peaks and troughs constitutes the market trend. Therefore, an uptrend is a series of successively higher peaks and troughs, while a downtrend constitutes a series of declining peaks and troughs. Horizontal peaks and troughs represent a sideways price trend.

A trend, as defined by Kleinman (2005), is the result obtained from the analysis of past prices. This provides the researcher with significantly more useful information as opposed to the analysis of a single price. By observing the direction of the trend and the velocity of the movement, the analyst is able to determine whether the bullish traders or bearish traders are stronger at the time.

Stevenson and Bear (1970) identify a trend as market movement in a systematic manner (opposed to random movement). This is highly correlated with the definition from Tversky and Kahneman (1971) who state that trends are patterns in short market sequences. For the purposes of this study, the definition by Edwards, McGee and Bessetti (2007) is most appropriate. They define a trend as a putative tendency of financial markets to trade into a particular direction over a certain period.

In turn, trends can be classified according to the timeframe applicable on the price movement.

7.2.2 Classification of market trends

In addition to possessing the characteristic of having three possible directions, trends can also be categorised according to their timeframes. In theory, an infinite number of trends based on time can be identified, ranging from trends covering from one minute's worth of data to trends over periods of up to a century. The majority of traders, however, limit trend classification based on timeframes to three alternatives, namely secular-, secondary- and near-term trends.

7.2.2.1 Secular (major) market trends

Secular, or major market trends, are known as long-term trends. According to Murphy (1999), the Dow Theory classifies a secular trend as a trend which is in effect for longer than a year. Since futures traders operate in shorter time dimensions than stock investors, it is generally accepted that any timeframe in excess of six months constitutes a secular trend in commodity futures markets.

7.2.2.2 Intermediate (secondary) market trends

Intermediate or secondary market trends are known as medium-term trends and historically last between three weeks and three months. Edwards et al. (2007) state that this type of trend is often referred to as a market correction within the greater secular market trend. The majority of trend-following strategies or approaches focus on intermediate trends in price discovery.

7.2.2.3 Near-term trend

The near-term trend is known as the shortest version of the alternative trends based on duration, and usually lasts for less than a couple of weeks. It is most commonly used for timing purposes when deciding when to enter into a trade (Murphy 1999).

Each trend eventually becomes a portion of the next larger market trend and is made up by a series of shorter-term trends. In a major uptrend, the market irregularly corrects itself by means of a temporary pause or decline in prices before continuing the upward momentum. This price decline, which may last for up to a couple of months, is in fact the intermediate or secondary market trend and is exploited by traders who enter into long positions within the major trend on the back of the correction. In turn, a series of near-term waves eventually develops into the secondary market trend. This is illustrated by Figure

7.1. Points 1, 2, 3 and 4 indicate the major uptrend. Wave 2 - 3 represents a secondary correction within the major uptrend, while the secondary correction itself consists of a near-term trend of minor waves (A, B and C).

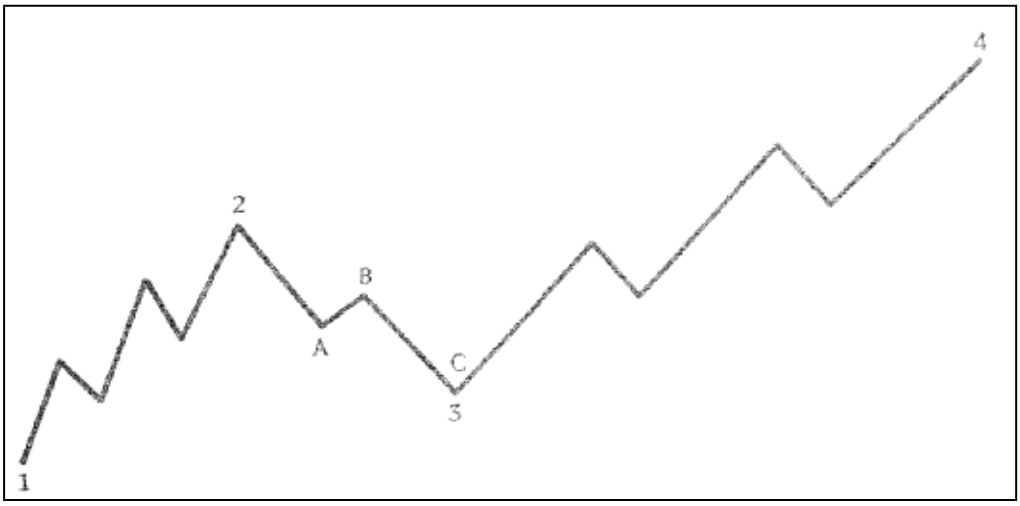

Figure 7.1 The three degrees of an upward trend

Source: Murphy (1999)

Figure 7.2 illustrates a major downward trend on the CBOT corn December 2004 futures contract. Points 1, 2, 3 and 4 indicate the major downtrend. Wave 2 - 3 represents a secondary correction within the major downtrend, while the secondary correction itself consists of a near-term trend of minor waves (a, b and c).

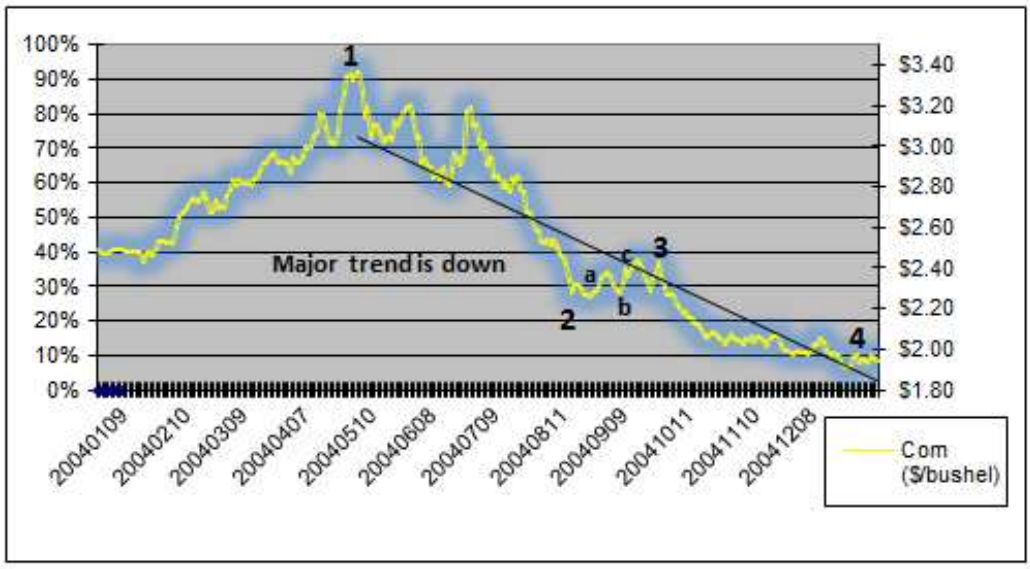

Figure 7.2 The three degrees of a downward trend on CBOT December 2004 corn futures prices

Source: CME Group (2011)

The ensuing section will focus on literature supporting market trends, as well as academic papers questioning the usefulness of these market movements.

7.3 THE VALIDITY OF MARKET TRENDS

The concept of a market trend is absolutely essential in the technical approach to market analysis. Tools applied by analysts such as support and resistance levels, price patterns and trendlines all have the common objective of determining and measuring market trends. This is done with the purpose of participating in the movement of a trend.

Contrasting views exist among researchers on the existence and validity of trends in futures markets, as well as the ability of traders to exploit these trends in a manner which will ultimately create social welfare. Experimental and empirical research on investor behaviour has confirmed the tendency of investors to analyse both short-term and long-term price trends in the formulation of trading strategies (Andreassen & Kraus 1990). It is therefore important to consider the academic research already completed on the effectiveness of trading methodologies based on market trends.

7.3.1 Supporting the existence of market trends

Alexander (1961) made use of a filter technique in demonstrating non-random trends over varying time intervals. He presented the view that, while price changes over fixed time intervals may be random, a move once initiated will eventually persist. In a similar vein, Houthakker (1961) applied filters to commodity futures contracts and determined that price trends can be clearly identified.

Stevenson and Bear (1970) applied various statistical tests to corn and soybean futures contracts. They concluded that a tendency for negative dependence over short periods was evident, while positive dependence over longer periods could be identified. Not only were these properties recognisable, but long-term segments proved to be profitable under certain mechanical trading patterns throughout the period covered by the analysis. They identified a secular downward market trend, which results in a decrease in real commodity prices of approximately 1% per year over a period of 140 years.

Singer (1950) applied the Prebisch-Singer hypothesis on commodity prices. This hypothesis states that the price of commodities relative to the price of manufactured goods should decrease over time. Singer's finding suggests that a clearly distinguishable downward trend in real commodity prices can be identified. This conclusion is supported by a study conducted by Grilli and Yang (1998) who found that the downward trend accelerated in 1921.

Kleinman (2005) supports the existence of trends in futures markets and states that the only way by which substantial profits can be achieved continuously is to follow a market trend. He emphasises the importance of not trying to exploit market peaks and bottoms, but rather to wait for trading signals provided by clear trends in prices. As an example, Kleinman uses the New Haven Railroad stock as case study. This blue chip stock traded as high as 279 points, and after a correction of 50 points, traders seemed anxious to buy the stock aggressively, citing the price decrease as a mere correction. The trend, however, changed. Few traders were willing to sell the stock as it was fundamentally rated as a potential high-earning stock and subsequently long positions were entered into in an ever-decreasing stock value. Ultimately, the stock traded as low 12 points and investors lost large amounts of money as they were reluctant to follow the market trend and opted to swim against the tide.

7.3.2 Rejecting the existence of market trends

Experimental research conducted by Tversky and Kahneman (1971) suggests that the primary reason for price-trend tracking may actually be psychological. Their study showed that traders often see price patterns or trends in short-term price sequences which are in fact random movements. In addition, investors tend to draw inferences by using the law of large numbers in small samples where the law is not applicable. A similar study conducted by Gilovich, Vallone and Tversky (1985) concluded that investors are likely to detect patterns and trends in a data sample even though the sample has been proved to follow a random walk.

Larson (1960) tested the theories of random walks versus price trends through an analysis into the price behaviour of commodity futures markets. By applying autocorrelograms to price data, he determined that the data under scrutiny behaved as a simple stochastic

process. This is consistent with Working's (1958) theory of anticipatory prices, which in effect implies that price movements are random at best.

Cargill and Rausser (1969) utilised spectral analysis of various commodities, including corn futures contracts. This entails that a specific period is decomposed into a number of components, each associated with a frequency or period. The decomposition yields a spectral density function and measures the relative importance of each of the frequency bands in terms of its contribution to the overall variance of the time-series. In effect, spectral analysis examines the variance of a time-series in relation to the frequency components. Through this analytical tool, Cargill and Rausser found evidence supporting the contention that corn futures prices behave in a random walk manner and past price movements cannot be used to forecast future prices accurately.

A study conducted by Cashin and McDermott (2002) on behalf of the International Monetary Fund noted that price variability is largely relative to the price trend. This implies that the forecasting of commodity prices based on market trends will indeed be a difficult, if not impossible task. The challenge faced by investors is that commodity prices are subject to movements unpredictable in magnitude and direction, which may also have persistent effects.

If market trends actually exist, it is important to determine the duration and magnitude thereof, since improving the general understanding of the duration and amplitude of trends will be essential in efforts to exploit the macroeconomic effects of movement in prices.

7.4 DURATION AND MAGNITUDE OF TRENDS

Information on the average duration and magnitude of commodity price trends can be used effectively in designing trading strategies, in examining the usefulness of borrowing externally in the presence of a temporary adverse movement, and in exploiting price movements with the objective of creating and enhancing social welfare. In addition, trends in volatility levels for primary commodities are a significant policy issue for commodity-exporting countries.

7.4.1 Volatility trends

Empirical research has been documented on volatility trends in commodity prices. Cuddington and Liang (1999) analysed conditional variances and the way in which they shift over time. They emphasise the importance of determining possible volatility trends as these lump together both the amplitude and duration of price movements and may prove useful in distinguishing between these effects while examining trends in commodity prices. According to Cuddington (1992), volatility is the main driver behind price trends and therefore trends in volatility may be useful in anticipating trends in commodity prices.

An empirical investigation by Anderson (1985) on the determinants of futures price volatility suggested that the dispersion of futures prices in agricultural markets exhibits changes in price over time in a systematic manner. This view is supported by Skerrit (2002), who mentions that seasonal volatility trends are not exclusive to commodity markets, but may be found in financial assets as well.

Goodwin and Schnepf (2000) analysed corn price volatility and concluded that increasing volatility levels tend to peak during the summer months before decreasing at a rapid rate in anticipation of harvest time and the consequent winter season. This suggests an upward volatility trend lasting up to six months in anticipation of the start of a six-month downward volatility trend.

Another research project carried out by Seeley (2009) aimed to determine the average duration of volatility cycles in futures markets. He examined the seasonal volatility patterns of corn futures prices by using high-frequency, intra-day price data to determine the effect of growing seasons on both continuous and discontinuous portions of volatility. The results confirmed the conclusion by Goodwin and Schnepf (2000) who found that both the realised variance and the bipower variation increase linearly from a low in February to a peak in July before decreasing towards the delivery date of the contract. This confirms an upward volatility trend of five months followed by a downward volatility trend lasting up to six months.

No research has been conducted on the magnitude of historical volatility dispersions.

7.4.2 Price trends

Very little previous academic work on the magnitude and duration of commodity price trends has been documented. Reinhart and Wickham (1994) analysed the persistence and duration of commodity price trends through the application of the Beveridge-Nelson decomposition technique. This technique, also known as the growth cycle, is calculated in terms of the deviation of the data series from the price trend. Reinhart and Wickham found that fundamental or technical shocks, which establish and drive trends in futures markets, exhibit differing degrees of persistence among the alternative commodities and therefore it is quite impossible to forecast the magnitude of price movement and duration of corn futures trends accurately.

Cashin and McDermott (2002) dealt with price data sets in levels and consequently avoided the subjective choice of which de-trending method to apply. Cashin and McDermott refer to this as the classical cycle which entails that price booms are described as periods of absolute increases in the level of the series and not as periods of above-trend growth. Conversely, price slumps are described as periods of absolute decreases in the level of the series and not as periods of below-trend growth. By applying this formulation to historical price data, Cashin and McDermott (2002) concluded that there seems to be a growth in the number or frequency of large price trends, which as a result tend to lead to a fall in the duration of each price trend.

The following section will aim to confirm the existence and duration of volatility trends (as discussed in 7.4.1) by evaluating historical volatility levels for corn futures contracts as traded on CBOT. The magnitude of volatility levels will be investigated in order to draw conclusions as to the extent by which price uncertainty impacts on volatility. In addition, corn futures prices as traded on CBOT will be evaluated with the objective of identifying the existence and duration of possible price trends, as well as the magnitude by which prices fluctuate from the mean. The possibility of finding a correlation between volatility trends and price trends will be investigated.

7.5 EXPLORING TRENDS IN HISTORICAL DATA

The existence and magnitude of trends in corn futures contract volatility and prices are analysed over the period 2000–2009.

7.5.1. Volatility trends

In order to determine the trend in the volatility of corn futures contracts, the average monthly volatility is calculated over the period 2000–2009. The monthly average over the ten-year period is determined in order to present the researcher with the eventual trend for the period under scrutiny. This is summarised in Table 7.1.

Table 7.1 Corn futures price volatility 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
Jan	22.4	17.9	12.0	20.2	26.0	20.1	19.1	38.1	32.2	50.9	25.9
Feb	14.4	12.1	13.1	11.4	17.9	20.9	23.1	27.9	22.2	30.2	19.3
Mar	25.6	19.2	11.6	18.5	23.6	22.6	30.7	23.0	40.8	36.6	25.2
Apr	16.8	20.8	11.4	12.5	26.3	20.1	19.8	36.8	28.9	28.7	22.2
May	26.0	21.3	23.2	22.6	27.6	25.0	31.3	42.0	29.2	16.6	26.5
Jun	28.8	16.6	20.2	19.7	29.9	33.8	28.8	38.1	35.1	41.4	29.2
Jul	20.4	41.6	42.1	16.6	20.4	42.2	26.7	30.1	36.5	46.3	32.3
Aug	16.2	19.1	24.7	25.4	23.4	22.4	30.2	27.3	51.2	28.4	26.8
Sep	18.5	17.3	28.0	22.8	15.1	16.0	39.5	39.2	49.4	55.2	30.1
Oct	17.4	15.0	19.2	28.6	18.0	10.5	43.5	31.4	63.9	43.0	29.0
Nov	17.0	21.4	16.7	25.2	15.5	9.5	26.9	22.6	46.0	35.2	23.6
Dec	15.7	11.2	13.0	18.3	16.7	19.5	26.3	20.1	59.8	29.2	23.0

Source: CME Group (2011)

Figure 7.3 graphically illustrates the average monthly corn futures price volatility for the period 2000-2009, as well as the polynomial trendline. The result supports the findings of Goodwin and Schnepf (2000) as well as those of Seeley (2009). In particular, the conclusion from Seeley correlates highly with Figure 7.3, as it confirms a low in the volatility trend during January before the start of an uptrend, which reaches a high in July. From July onwards, volatility levels decrease substantially in anticipation of delivery against the futures contract.

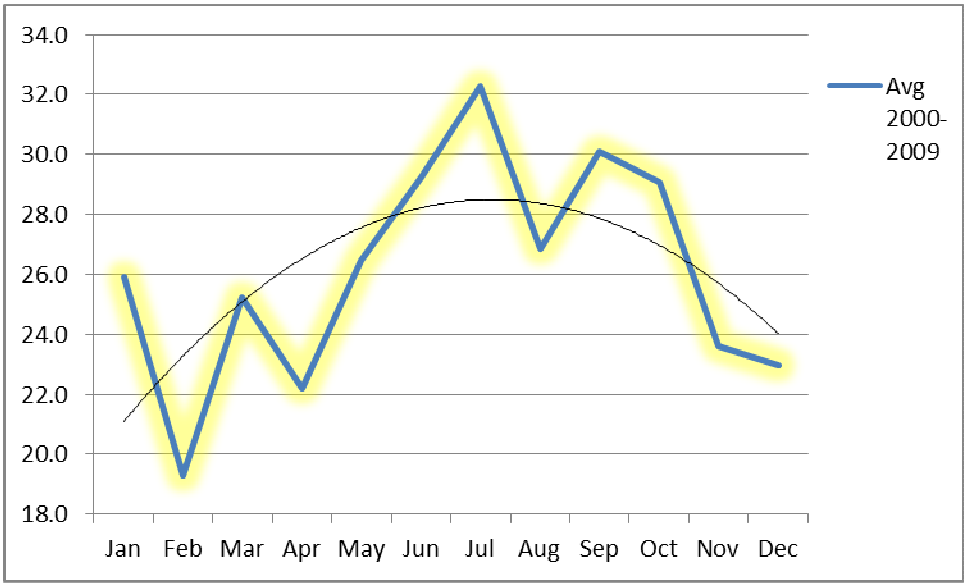

Figure 7.3 Average monthly corn futures price volatility for period 2000–2009

Source: CME Group (2011)

Since the average duration of volatility trends in corn futures contracts have been determined, it is of importance to calculate the magnitude by which volatility levels deviate from the mean. Figure 7.4 depicts the average monthly corn futures price volatility for the period 2000–2009 versus the total average volatility of 26.1% calculated over the same period (indicated by the red horizontal line).

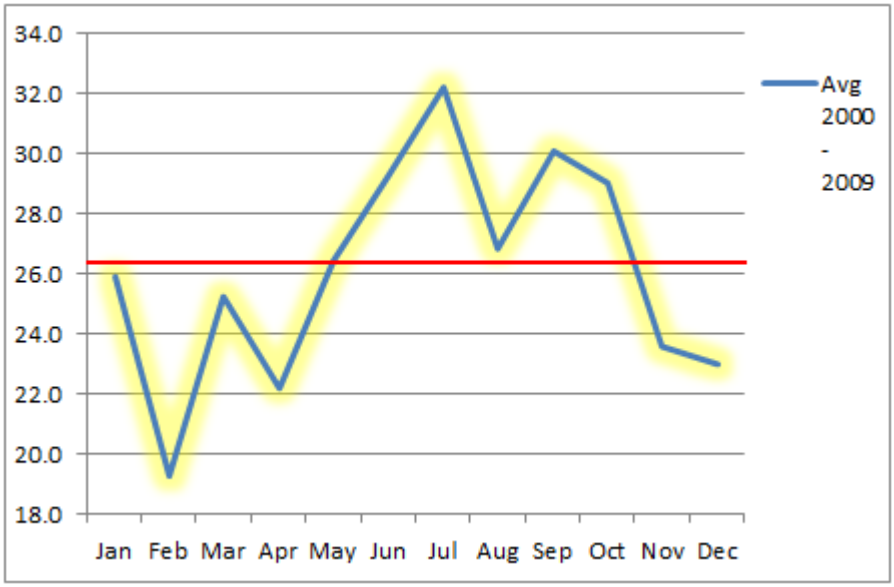

Figure 7.4 Average monthly corn futures price volatility for period 2000–2009 vs. average total volatility

Source: CME Group (2011)

As illustrated by Figure 7.5, on average January to April and November to December represents below average monthly volatility levels. These months fluctuate between 0.2% and 6.8% below average. May to October represents above average monthly volatility levels. These months trade between 0.4% and 6.2% above the total average volatility.

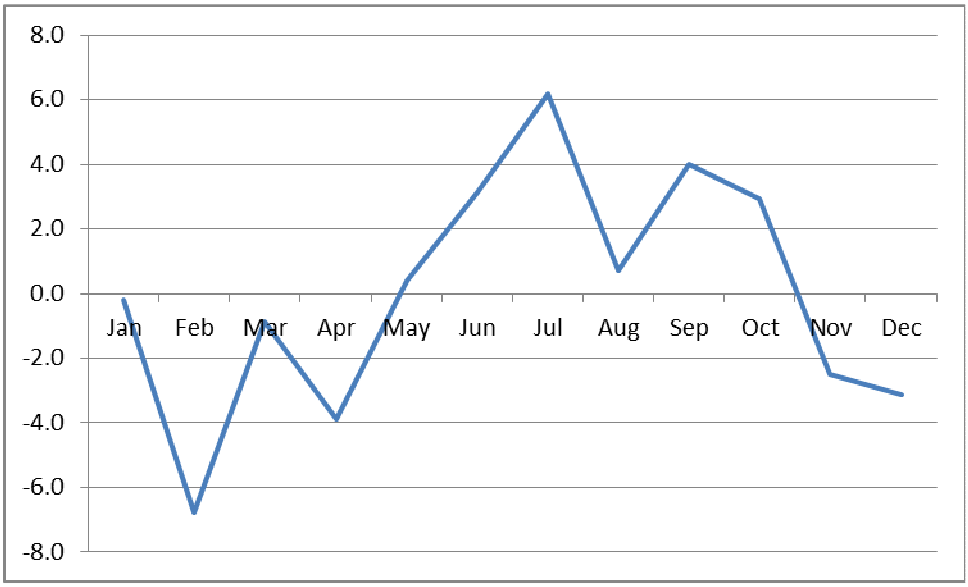

Figure 7.5 Magnitude of monthly average volatility above/below total average

Source: CME Group (2011)

The reason for the seasonal trends in corn price volatility is fundamental in nature. The US corn crop is planted during the months of April and May, while pollination occurs over the period stretching from the end of June to the middle of August. Since the total corn production is calculated as plantings multiplied by yield, volatility levels tend to be high over the period when adverse weather conditions can negatively impact on the size of the crop. Once the size of the crop can be accurately estimated in August (since it is no longer vulnerable to variations caused by weather conditions) volatility trends lower. Therefore, it can be concluded that corn futures price volatility flourishes during uncertain market conditions.

7.5.2. Price trends

Similar to the volatility calculations, the annual corn futures contract price trend is determined by calculating the average monthly price over the period 2000–2009. The monthly average price over the ten-year period is determined in order to present the

researcher with the eventual price trend for the specific period. This data is summarised in Table 7.2.

Table 7.2 Average monthly corn futures prices 2000–2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
Jan	$2.45	$2.53	$2.37	$2.41	$2.65	$2.31	$2.49	$3.84	$5.05	$4.36	$3.05
Feb	$2.51	$2.46	$2.32	$2.42	$2.83	$2.32	$2.59	$4.06	$5.40	$4.04	$3.10
Mar	$2.55	$2.41	$2.28	$2.37	$3.00	$2.39	$2.58	$4.05	$5.67	$4.11	$3.14
Apr	$2.54	$2.32	$2.20	$2.39	$3.17	$2.33	$2.70	$3.79	$6.13	$4.18	$3.18
May	$2.57	$2.18	$2.24	$2.43	$2.95	$2.30	$2.74	$3.75	$6.26	$4.42	$3.18
Jun	$2.28	$2.11	$2.29	$2.38	$2.91	$2.41	$2.64	$3.93	$7.30	$4.34	$3.26
Jul	$1.96	$2.27	$2.45	$2.16	$2.44	$2.51	$2.65	$3.43	$6.65	$3.37	$2.99
Aug	$1.91	$2.29	$2.70	$2.29	$2.35	$2.29	$2.46	$3.48	$5.69	$3.34	$2.88
Sep	$1.93	$2.21	$2.72	$2.31	$2.18	$2.10	$2.49	$3.59	$5.46	$3.25	$2.82
Oct	$2.04	$2.08	$2.52	$2.26	$2.05	$2.02	$3.03	$3.58	$4.13	$3.72	$2.74
Nov	$2.11	$2.05	$2.43	$2.37	$1.99	$1.93	$3.56	$3.82	$3.74	$3.90	$2.79
Dec	$2.08	$2.09	$2.36	$2.49	$1.95	$1.91	$3.60	$4.03	$3.26	$3.82	$2.76

Source: CME Group (2011)

Figure 7.6 graphically illustrates the average monthly corn futures price for the period 2000–2009, as well as the polynomial trendline. From the graph, the conclusion can be drawn that corn futures prices increase on average from January to June, after which a rapid decline is evident over the last seven months of the year in anticipation of harvest-time and delivery against futures contracts.

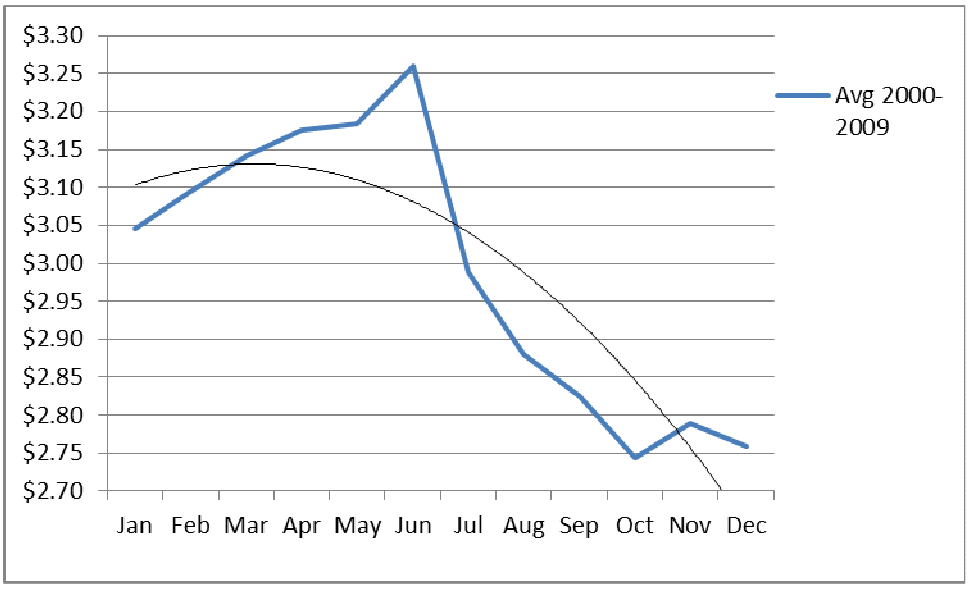

Figure 7.6 Average monthly corn futures prices for period 2000–2009

Source: CME Group (2011)

It remains important to calculate the magnitude by which the average monthly corn futures price deviates from the mean, since this deviation will determine whether the price

movement is essential and substantial. Figure 7.7 depicts the average monthly corn futures price for the period 2000–2009 versus the total average corn futures price of $2.99/bushel calculated over the same period (indicated by the red horizontal line).

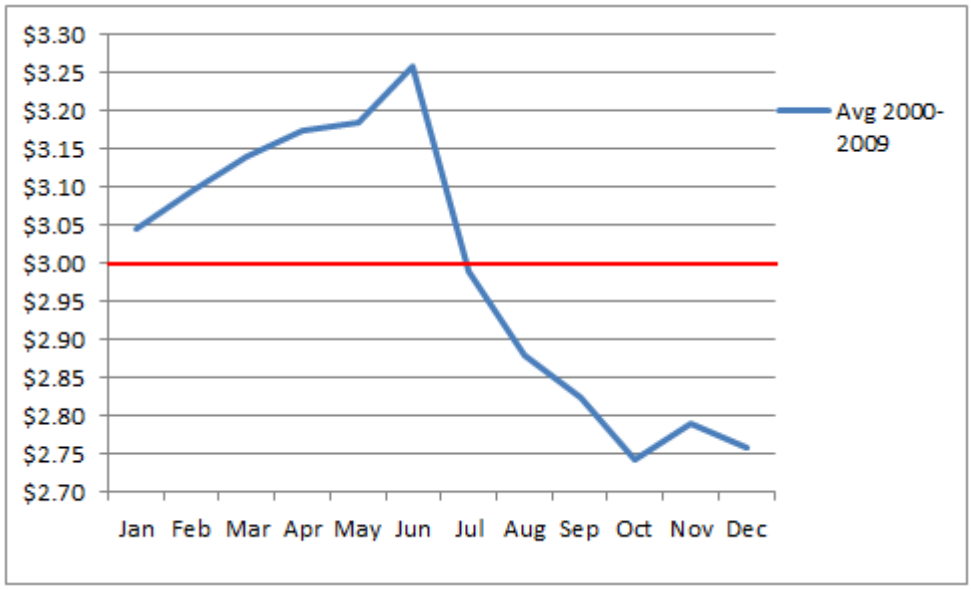

Figure 7.7 Average monthly corn futures price for period 2000–2009 vs. total average price

Source: CME Group (2011)

As illustrated by Figure 7.8, on average, January to June corn futures prices exceed the total average corn futures price by between $0.06/bushel and $0.27/bushel. The period August to December trades on average between $0.11/bushel and $0.25/bushel lower than the total average corn futures price.

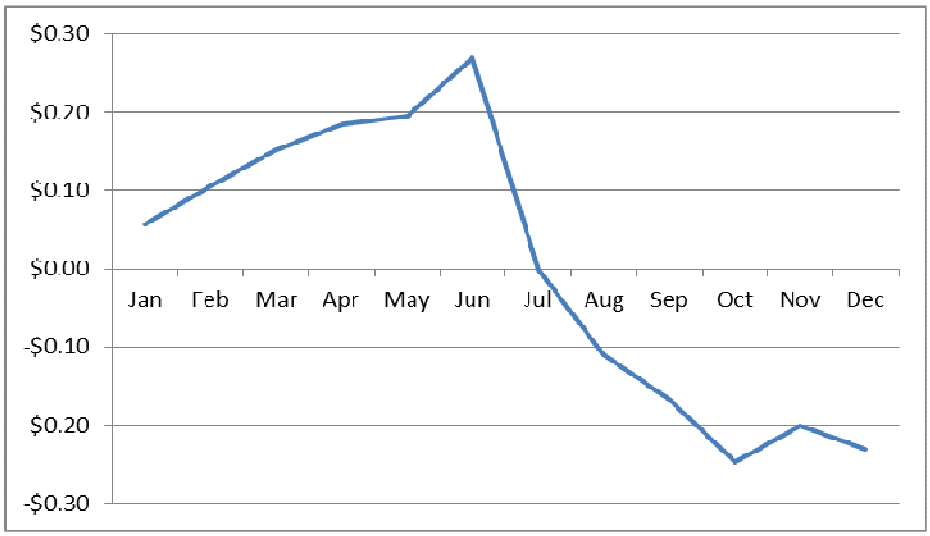

Figure 7.8 Magnitude of monthly average price above/below total average

Source: CME Group (2011)

7.5.3 Correlation between volatility and price trends

By comparing the average monthly corn futures price volatility (as depicted in Figure 7.3) with the average monthly corn futures price (as illustrated in Figure 7.6) for the period 2000–2009, it is obvious that a high degree of overlapping exist.

Figure 7.9 highlights the close correlation between volatility and price. As volatility increases on uncertain production conditions and crop size, prices tend to move higher. Once uncertainty gives way to more accurate production estimates and less risk is associated with the eventual size of the crop, volatility decreases along with lower futures prices. The conclusion is therefore that corn futures contract prices flourish on uncertain market conditions.

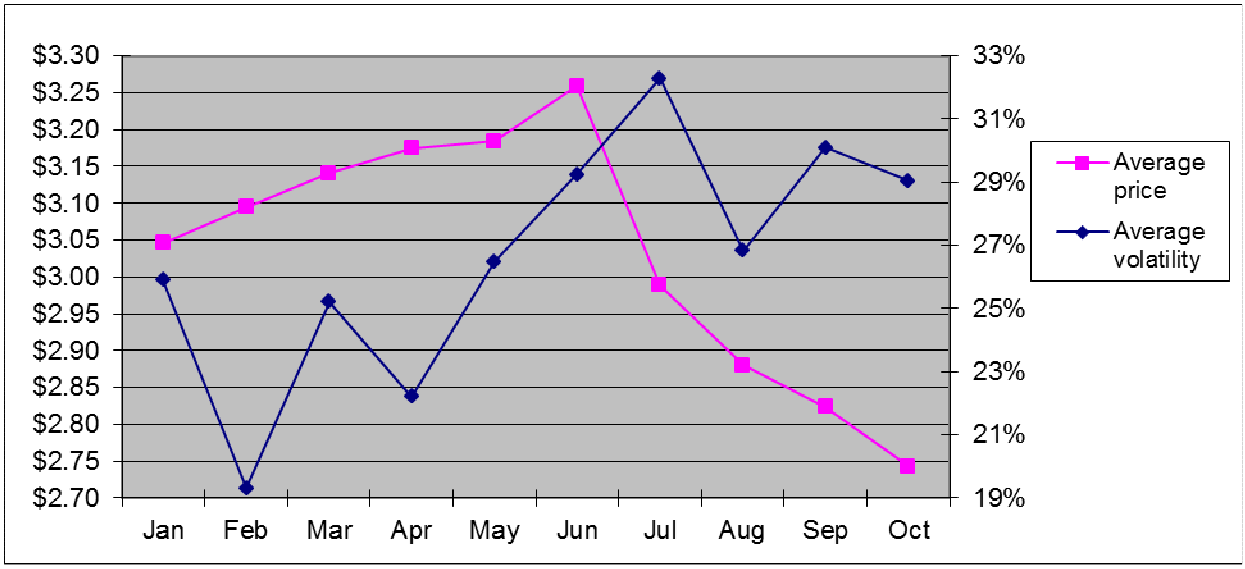

Figure 7.9 Correlation between monthly average corn futures price and price volatility 2000–2009

Source: CME Group (2011)

7.6 SUMMARY AND CONCLUSIONS

A trend can be observed by analysing previous prices and is defined as a putative tendency of financial markets to trade into a particular direction over a certain period. A trend consists of a series of short-term random movements resembling successive waves with obvious peaks and troughs. The direction of these peaks and troughs constitutes the market trend.

Trends can be classified according to either direction or timeframe applicable. An upward market trend is a series of successively higher peaks and troughs, while a downtrend constitutes lower peaks and troughs. Horizontal peaks and troughs represent a sideways trend. Trend classification based on timeframes can be categorised as being secular, intermediate or near term in nature. Secular trends are known as long-term cycles and they last in excess of six months. Intermediate trends are defined as medium term in nature while near-term trends are known as the shortest version based on duration. Trend-following strategies and approaches focus on intermediate trends in price discovery.

Researchers conducting investigation into the validity and effectiveness of trend-following risk management strategies have not reached consensus on the feasibility of trading on the back of identifiable market trends. Academic work supporting market trends cites empirical results as justification for strategies based on perceived market trends, while research opposing the existence of market trends highlights the random walk as main objection.

Information on the average duration and magnitude of market trends can be useful in developing trading strategies. Research suggests historical intermediate upward volatility trends in corn futures contracts from February to July, followed by an intermediate downtrend lasting from August to December. This is supported by empirical evidence. Limited academic work has been done on the duration of price trends, but an investigation into historical corn prices indicates an intermediate uptrend from January to June, followed by an intermediate downtrend from July to December. This highlights the high degree of correlation evident between price and volatility.

The next chapter will discuss and define the research design and methodology applied in gathering and analysing the empirical information pertaining to the development of a forecasting methodology which will ultimately contest the efficient market hypothesis. This will be done in a sequence whereby the research findings can be reported in a scientifically accepted manner.

CHAPTER 8
RESEARCH DESIGN AND METHODOLOGY

8.1 INTRODUCTION

The initial stages of this study focused on literature research relating to the trading of futures- and options contracts on the soft commodities futures market. In addition, discussions on various aspects pertaining to the research problem provided definitions, research results and business practices which, in conjunction, will ultimately provide the foundation upon which the final proposed price risk management methodology will be based.

Every type of empirical research includes an implicit, if not explicit, research design and methodology which connects empirical data to the initial research question of the study and in due course to its conclusions. As such, the research design is the blueprint of the research that is being conducted and consists of a set of flexible guidelines, which connects theoretical paradigms to strategies of inquiry and methods of collecting empirical material.

This chapter provides a detailed discussion on the individual stages in the business research process. In particular, emphasis is placed on the role of the research design, research methods and statistical techniques applied in analysing the data obtained. The methodology applied in gathering data and analysing the empirical information will be defined and presented in a logical sequence. This will be done in order to allow the researcher to report the findings detailed in Chapter 9 in a scientifically acceptable manner.

8.2 THE BUSINESS RESEARCH PROCESS

According to Zikmund, Babin, Carr and Griffin (2010), business research, or otherwise known as the application of scientific methods in the search of answers regarding business

phenomena, involves a logical sequence of interrelated activities. Even though these activities overlap continuously, Zikmund et al. (2010) categorise business research into a general pattern of successive stages (Figure 8.1):

- stage one: defining and highlighting the objectives of the research study;
- stage two: planning of the research design;
- stage three: obtaining a sample;
- stage four: gathering data from the chosen sample;
- stage five: processing and analysing the data obtained; and
- stage six: deriving conclusions.

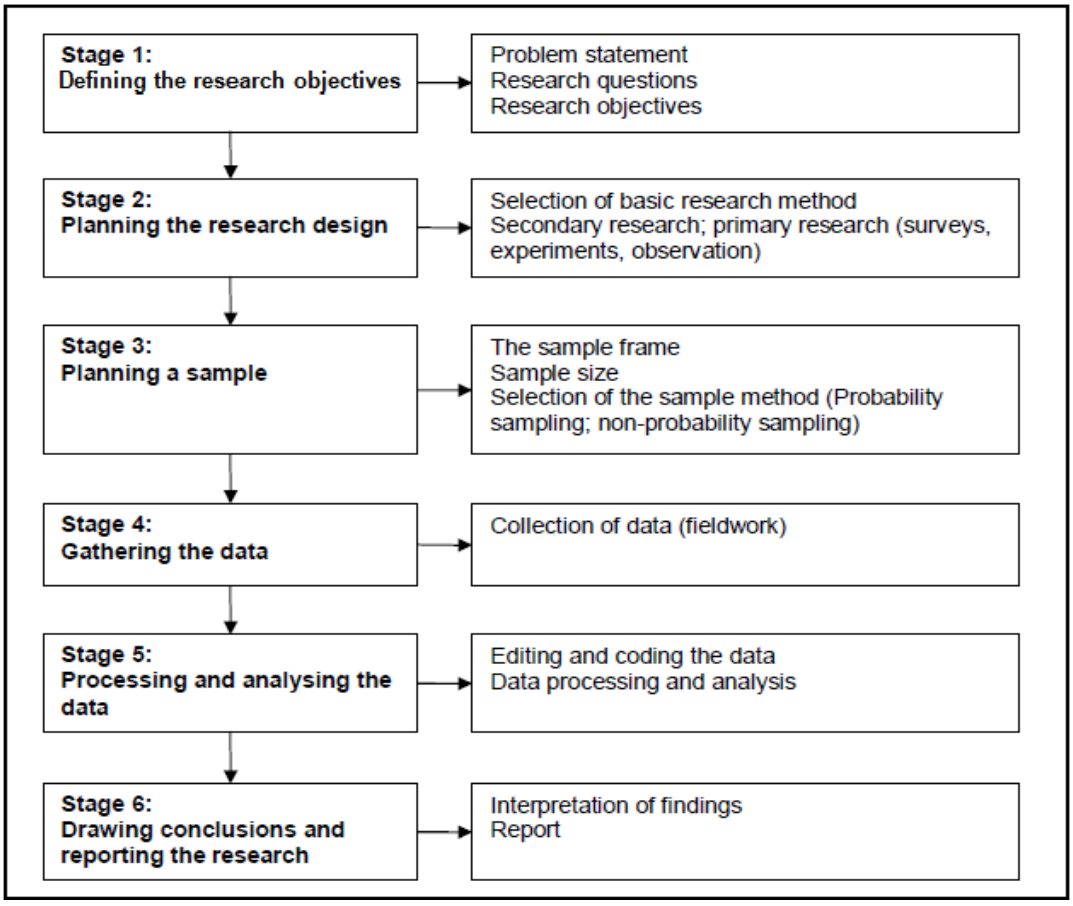

Figure 8.1 Classification of stages in the business research process

Source: Zikmund et al. (2010)

Each of these stages is discussed in detail in the ensuing sections.

8.3 RESEARCH OBJECTIVES

The first stage of the business research process consists of an explanation into the objectives or goals of the research project (Saunders et al. 2009). This is important, since the research community will accept research objectives as clear evidence of the researcher's sense of purpose and direction. The existence of research objectives are also likely to result in greater specificity than common investigative questions.

Maylor and Blackmon (2005) state that research objectives need to adhere to the so-called SMART-test. According to this, objectives should be:

- **s**pecific;
- **m**easurable;
- **a**chievable;
- **r**ealistic; and
- **t**imely.

Research objectives are defined upon the discovery of a problem. The source of this so-called problem area may be found in practical problems, previous research or research theories (Welman & Kruger 2001). Table 8.1 depicts the alternative sources of research problems as well as the origin of the circumstances giving rise to the problem. It is evident that a problem occurs when a lack of correlation exists between the current knowledge and the desired body of knowledge.

Table 8.1 The source and circumstances underlying research problems

Source of research problem	**Circumstances underlying research problem**
Practical problems	Ineffective political, social and economic circumstances
Previous research	Gaps or contradictions in research resulting in more new questions than it originally set out to answer
Research theories	Unclear relationships between known variables

Source: Welman and Kruger (2001)

In formalising stage one, it is necessary to clearly distinguish between the three components of research objectives, namely the problem statement, research questions and research objectives applicable to the particular study (Tustin, Ligthelm, Martins & Van Wyk 2005).

8.3.1 Problem statement

The problem statement aims to define the problem underlying the study in such a manner that it will ultimately represent the single objective of the total research effort (Leedy & Ormrod 2010). It has been suggested that research contributing most to the physical, biological, psychological and social academic worlds are those who pose problem statements or questions which ultimately lead the user into entirely new lines of inquiry.

The development of a problem statement requires considerable knowledge on the subject area, given the complexity of formulating a research idea into a problem statement which is researchable (Kumar 2011). This remains the most important step in the business research process as a clear and feasible research plan and objective will prove impossible in the absence of a well-defined problem statement.

Chapter 1 provided compelling evidence that the CBOT corn futures contract is entering a new era of exceptional high price volatility (Irwin and Good 2009). A structural shift in nominal corn prices is adding to the already intolerable high volatility levels. As a result, price volatility and movement is the least manageable factor threatening the existence of market participants (Nivens et al. 2002). Research conducted on the effect of volatile prices on the income of producers identified price risk as one of the largest sources of risk faced by US producers (Patrick & Ullerich 1996; Coble et al. 1999) with two-thirds marketing their crop in the bottom third of the price range (Irwin et al. 2006). Processors experience equal difficulty in managing the magnitude of price movement, highlighted by the bankruptcy of VeraSun and Pilgrim's Pride in 2008 as a result of ineffective procurement strategies. This underlines the timing of purchases as the most important implication of the magnitude of price volatility (Irwin & Good 2009). According to Wang (2001), speculators in the futures market are unable to predict future grain price movements accurately, while research studies question the effectiveness of market advisory services in managing market volatility and price fluctuations (Marquardt & MqGann 1975; Kastens & Schroeder 1996; Irwin et al. 2006).

The problem statement for the current research was defined as follows:
What is the possibility of accurately forecasting future price movements for the CBOT corn futures contract through a technical and trend analysis in such a manner that a single derivative price risk management methodology can be formulated for simultaneous use by

long hedgers, short hedgers and speculators that will mitigate price risk, while still providing the user with a force majeure and resulting in returns superior to those offered by the market?

8.3.2 Research questions

The research question is one of a number of key questions which the research process will address. According to Saunders et al. (2009), it is often the precursor of the research objective(s), and the extent to which a clear set of conclusions can be drawn from the collected data depends largely on the clarity with which the initial research question was posed.

The importance of a clear and thorough research question is confirmed by the amount of academic work completed on the subject. Clough and Nutbrown (2002) provide a classification into the alternative research question categories. Table 8.2 explains this in further detail.

Table 8.2 Classification of research questions

Research question categories	**Explanation**
Too big	Significant research funding is needed as question demand too many resources
Too small	Research question is of insufficient substance
Too hot	Sensitivities may arise as a result of research
Just right	Research question is just right for investigation at this time by this researcher in this setting

Source: Clough and Nutbrown (2002)

According to McNiff and Whitehead (2000), it is possible that the research question may not emerge until the start of the research process. As a result, question formulation may form part of a process commonly referred to as 'progressive illumination'. It is necessary to ensure that the research question is specific in nature and fact-orientated. It should be formulated with the objective of gathering information on the question (Cooper & Schindler 2003). With the problem statement of this study as background (see 8.3.1), the following research questions (RQ) have been formulated:

RQ_1: Is it possible to forecast future price movements accurately through an analysis of trends and technical indicators?

RQ_2: Which technical indicators should be applied in order to identify and determine future price movements with the objective of exploiting market trends?

RQ_3: Will the study be relevant and feasible to all market participants (long- and short-position holders) of derivative instruments on the CBOT?

RQ_4: What is the possibility of applying a single hedging/speculative derivative risk management methodology to futures prices on an annual basis notwithstanding the existence of a bullish/bearish/neutral market?

RQ_5: Can the proposed methodology be developed in a manner that incorporates a worst-case futures price level at inception of the strategy, while still allowing for improved realised prices should market prices trend favourably?

RQ_6: What is the importance and significance of a force majeure characteristic?

RQ_7: What is the generally accepted price benchmark in the soft commodities futures market against which results obtained from the application of the methodology should be compared?

RQ_8: Do results achieved from the implementation of the hedging/speculative methodology emphasise the benefits of an actively managed strategy versus that of a passive strategy?

8.3.3 Research objective

The research objective is the ultimate goal or purpose of the study (Kumar 2011). It consists of clear, specific statements, which identify what the researcher wishes to achieve or accomplish as a result of doing the research (Saunders et al. 2009).

The main objective of this study is to develop a price risk management methodology for participants on the CBOT corn futures market. The methodology should be able to forecast

future price movements accurately and therefore will provide the user with returns in excess of those offered by the market itself. In order to achieve the main objective of the study, several secondary objectives had to be reached as well. The secondary objectives (SO) were as follows:

SO_1: *Determine the need of market participants for a risk management methodology by exploring their ability to predict future price movements accurately through an extensive literature study.*

SO_2: *Determine the possibility of forecasting future price movements accurately through an analysis of trends and technical indicators.*

SO_3: *Determine which oscillators should be applied in order to identify and determine future price movements.*

SO_4: *Investigate the existence of price and volatility trends.*

$S0_5$: *Determine the possibility of applying a single hedging/speculative derivative risk management methodology successfully to futures prices on an annual basis notwithstanding the existence of a bullish/bearish/neutral market.*

$S0_6$: *Consider the development of the proposed methodology in a manner that incorporates a worst-case futures price level at inception of the strategy, while still allowing for improved realised prices should market prices trend favourably.*

$S0_7$: *Determine the generally accepted price benchmark in the soft commodities futures market against which results obtained from the application of the methodology should be compared.*

Based on the literature study, it is acknowledged that the need for a risk management methodology exists among market participants. Therefore, empirical research was conducted in order to provide answers to the problem statement and research objectives discussed in the previous sections.

The research design for the particular study follows the research objectives as the next step in the business research process.

8.4 RESEARCH DESIGN

The previous section defined the research objectives of the study as the initial phase of the business research process. As a starting point in the discussion regarding the formulation of the most appropriate research design for the specific study, it was necessary to define this concept clearly. In addition, a general discussion regarding the development of a research design is necessary in order to emphasise the place and importance of a well-structured design within the total business research process.

8.4.1 Definition and general background

This section will provide a definition relating to the research design, as well as a general discussion on the importance of the concept.

8.4.1.1 Definition

The following definitions provide a sufficient explanation about the core elements inherent in a research design.

Kumar (2011) defines a research design as a procedural plan, such as adopted by the researcher. The objective of this plan was to answer questions in a manner that would enhance validity, objectivity and accuracy. The procedural plan should also be economically viable in order to justify its implementation.

According to Saunders et al. (2009), the research design stipulates the general plan regarding the manner in which the researcher will go about answering the research questions. The research design will therefore contain clear objectives as well as specifications regarding the sources from which data will be collected. This is similar to the definition provided by Welman and Kruger (2001). They state that a research design is the plan according to which research participants are obtained and information derived from the particular sample.

As such, it can be concluded that the research design guides the researcher in formulating appropriate research questions and hypotheses, as well as in reporting the findings derived from the research project. Therefore, the research design possesses two main functions: The first relates to the development and identification of procedures and arrangements required to undertake a study, while the second emphasises the importance of quality in the procedures to ensure objectivity and accuracy (Kumar 2011).

8.4.1.2 General background

The research design guides the researcher in planning, obtaining and organising the data required for the research study. In addition, it is a helpful tool in analysing and interpreting all of the applicable data. It dictates the manner in which the data is obtained, and guides the approach which is followed to derive meaning from the data gathered. In particular, it provides assistance in the formulation of an accepted conclusion, which results in contributing to the expansion of the body of knowledge (Leedy, Newby & Ertmer 1997). As such, the research design ensures that the research objectives are addressed sufficiently.

It is important to develop a credible research design as this helps to prevent a situation where the evidence derived does not address the initial research question; hence, the design deals with logical problems and not logistical problems. In addition, the design also addresses the two critical issues of representation and legitimisation (Saunders et al. 2009). In general, the research design deals with four problems:

- which questions to study;
- which data are relevant;
- which data to collect; and
- how to analyse results.

The researcher should fully understand the manner by which the relevant data is gathered. This will allow for a better assessment of research findings, interpretations, recommendations and conclusions. It will also provide the user with better judgement on the validity and reliability of the data obtained (Ali 2003).

8.4.2 Classification of alternative research designs

The classification of alternative research design types, based on the purpose of the research being conducted, is illustrated in Figure 8.2. The illustration indicates that business research can be conducted under three different types of research design categories, namely exploratory research, descriptive research and causal research.

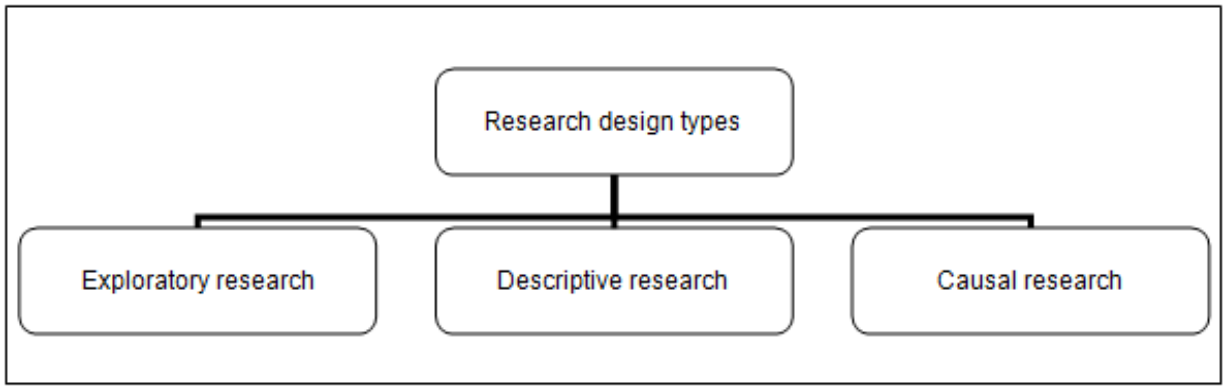

Figure 8.2 Research design classification

Source: Saunders et al. (2009)

8.4.2.1 Exploratory research

An exploratory research study is undertaken with the objective to explore an area of which little is known, to investigate the possibility of entering into a particular research study or to discover potential business opportunities (Kumar 2011). This type of study is often carried out when the researcher wishes to explore an area with little or no practical experience in the particular field of study.

In general terms, exploratory research is the start of the research process with little expectations that the research will provide an accepted conclusion to the research objectives. Usually additional research is needed in order to formalise accepted conclusions, and exploratory research is helpful in this regard since it is used in refining the subsequent research studies (Zikmund et al. 2010).

8.4.2.2 Descriptive research

Leedy and Ormrod (2010) state that a descriptive research study attempts to identify the characteristics of an observed phenomenon or to explore the potential correlation between two or more variables. As a result, descriptive research does not involve changing or modifying the circumstances under investigation, neither does it attempt to determine

cause-and-effect relationships. A distinct feature of this type of research study is therefore that it examines a situation as it is at the time of conducting the research.

The main objective of a descriptive study is to describe the conditions that are prevalent with respect to the problem being investigated (Welman & Kruger 2001). This type of research study is only entered into when the researcher has proved that he/she fully understands and appreciates the situation being investigated.

An important aspect in the development of a descriptive research study is the existence of a clear research question, as this will prove to be helpful for the researcher in the design and implementation of a descriptive study (Zikmund et al. 2010).

8.4.2.3 Causal research

Causal research attempts to clarify the relationship between two or more variables in which the change (effect) in one variable is caused by the other variable (Welman & Kruger 2001; Saunders et al. 2009).

Researchers may use this type of research study to determine whether the value of one variable is actually the result of another variable. Four types of variables can be distinguished, namely dependent variables, independent variables, extraneous variables and intervening variables (Kumar 2011).

Different research methods are applied under the three alternative research design types. These methods are depicted in Figure 8.3.

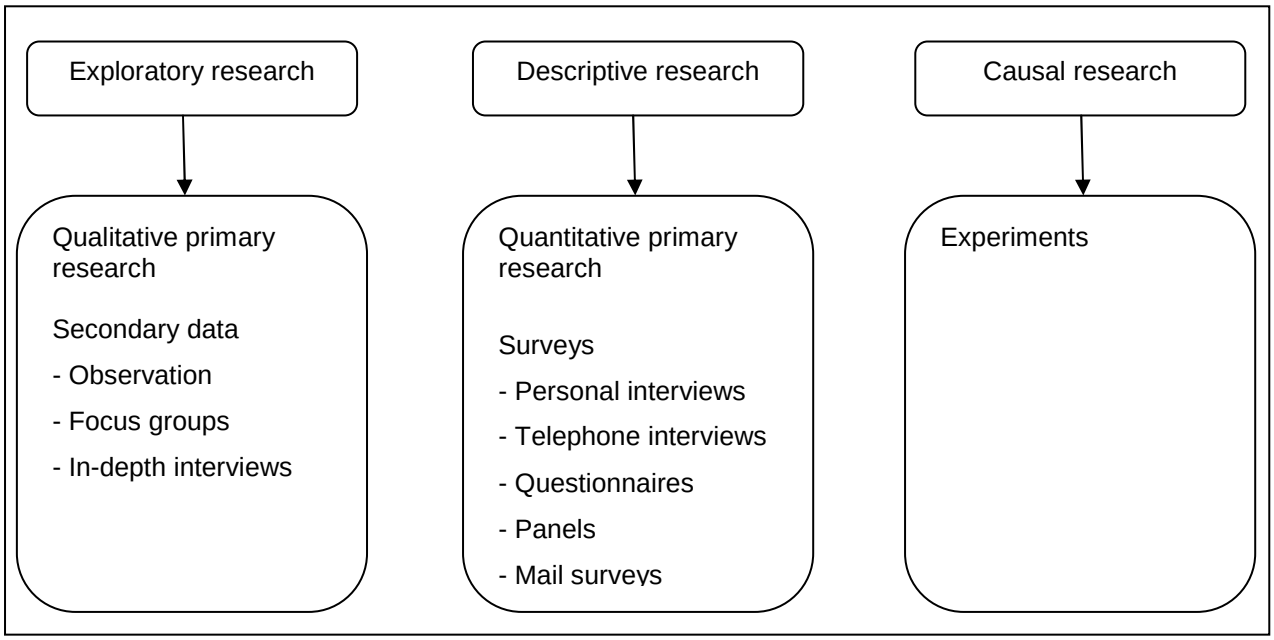

Figure 8.3 Summary of research methods categorised under research design types

Source: Saunders et al. (2009); Leedy & Ormrod (2010); Kumar (2011)

- Exploratory research methods are qualitative in nature. The research methods applicable include observations, focus groups and in-depth interviews (Saunders et al. 2009; Leedy & Ormrod 2010; Kumar 2011).

- Descriptive research methods are quantitative in nature. In theory, descriptive research methods include personal interviews, telephone interviews, questionnaires, panel discussions and mail surveys (Saunders et al. 2009; Leedy & Ormrod 2010; Kumar 2011).

- The most commonly used causal research method is the experiments (Kumar 2011).

From the discussion on the classification of the alternative research design structures available to researchers, as well as the methods applicable to the different structures, it can be concluded that the current study was predominantly descriptive in nature, although it showed characteristics of exploratory research as well. This can be attributed to the literature study initially conducted in order to determine the effect of price volatility on market participants. In addition, the literature study provided valuable background on the price risk management performance of producers, processors, speculators and market

advisory services. This proved to be the starting point for the development and formulation of a methodology aiming to contest the efficient market hypothesis.

Upon dealing with the various data collection and measuring instruments, researchers can broadly distinguish between secondary and primary data sources. Welman and Kruger (2001) state that secondary data are information which have been collected by either individuals or institutions other than the researcher self. Primary data sources are original data collected by the researcher for own academic or research purposes.

8.4.3 Secondary data analysis versus primary data analysis

As shown in Figure 8.3, exploratory research tends to make use of secondary data while descriptive research focuses on primary data analysis.

8.4.3.1 Secondary data analysis

In order to realise the research objectives as set out initially, exploratory research was conducted through a secondary data analysis (Welman & Kruger 2001). The purpose of research through secondary data analysis is to gain a deeper understanding of the research problem while broadening the scope of the researcher upon facing the problem at hand.

A wide variety of secondary sources was consulted through an extensive literature study. These included accredited journal articles, government reports, books written on the relevant topic and papers delivered at conferences. The subject of corn price volatility and the resultant impact on market participants was discussed in Chapters 2 to 7, with a focus on providing a theoretical and practical background on derivative instruments, explaining and measuring price volatility and evaluating the hedging performance of market participants.

Mouton (2005) identifies the following advantages and disadvantages of using secondary data:

Advantages

- By using secondary data, the researcher can access relevant information more quickly than when using primary data.

- Secondary data allow the researcher to obtain information at a lower cost than primary data.

Disadvantages

- Secondary data restrict the user in the original objective of the research.
- The researcher cannot control errors in the data obtained.

8.4.3.2 Primary data analysis

Preference is usually given to primary data sources over secondary data sources, as each transfer of data from one source to another increases the risk of distorting information either inadvertently or deliberately (Welman & Kruger 2001).

Tustin et al. (2005) indicate that primary data are collected with the specific purpose of addressing the research objective when secondary data prove to be insufficient or ineffective. When deciding on the collection and use of primary data, the researcher should decide on the most appropriate research approach as well as the most effective data collection method.

The choice of approach is limited to either quantitative or qualitative research.

- Quantitative research aims to achieve a generalisation about a specific population by obtaining numerical information or data from large numbers of individuals or institutions and projecting these results to the wider population as a whole (Tustin et al. 2005).

- Leedy and Ormrod (2010) state that qualitative research focus on non-numerical phenomena, which occur in natural settings or the so-called real world and which prove to be difficult to quantify. In addition, qualitative research involves studying the phenomena in all of their complexity. It is difficult, if not impossible, to derive any general conclusions from qualitative data.

Saunders et al. (2009) define triangulation as the use of two or more independent sources of data or data-collection methods within one study. This definition is an accurate portrayal of the study at hand, since a qualitative approach was followed to provide a conceptual framework from literature, while a quantitative approach was followed in the form of a structured questionnaire.

8.4.4 Data collection methods

Three basic primary data collection methods exist (see Figure 8.4). These include survey data collection, observational data collection and experimental data collection.

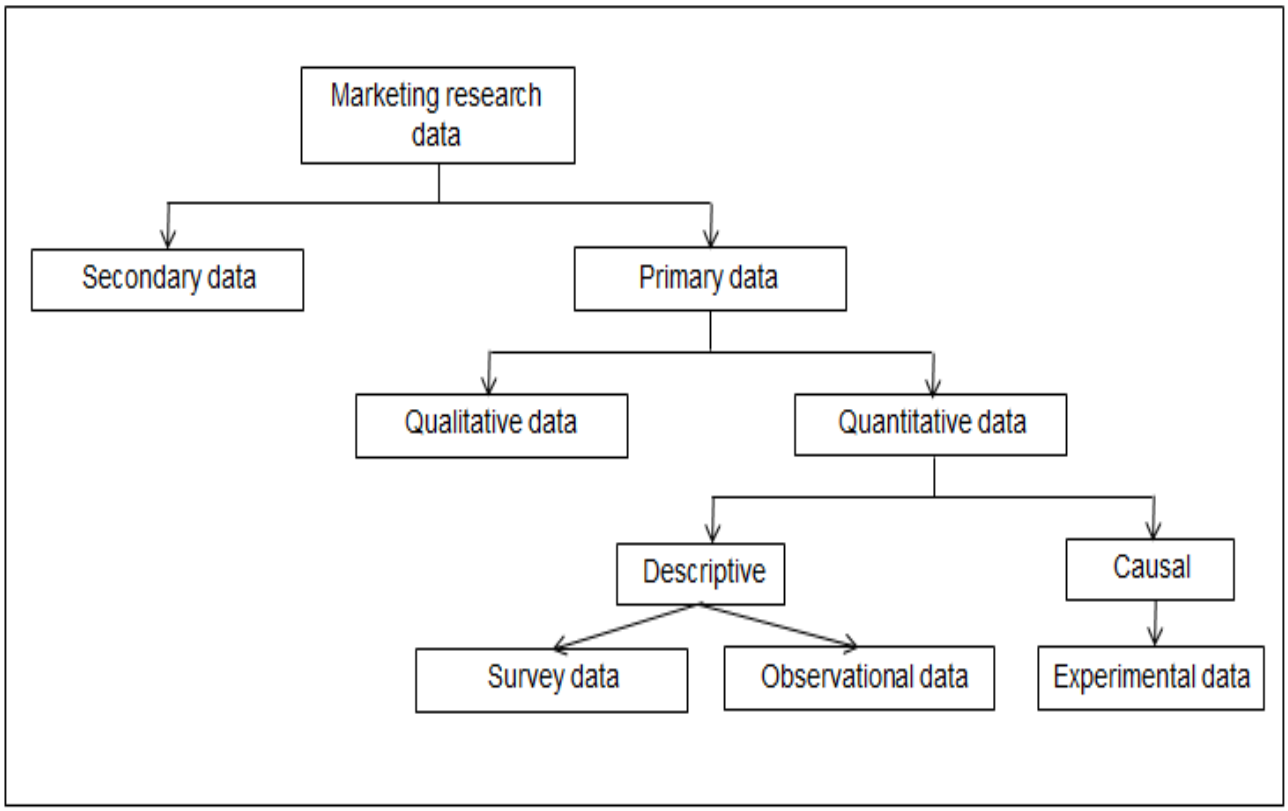

Figure 8.4 Classification of primary research collection methods

Source: Saunders et al. (2009)

According to Saunders et al. (2009), survey data collection involves a research strategy whereby data is collected in a structured manner from a sizeable population. Surveys are a popular collection method as it allows for the sampling of a large amount of data in a highly economical way. The most popular survey techniques are:

- questionnaires;
- structured interviews; and
- structured observations.

The questionnaire is the most widely used data collection technique within the survey strategy. This can be attributed to each respondent receiving the same set of questions which enhances validity. Furthermore, it is an effective manner by which data can be obtained from a large sample prior to quantitative analysis (Saunders et al. 2009). The

questionnaire is essentially a document containing questions, which have been designed with the objective of obtaining information from the sample population (Tustin et al. 2005). It can be defined as a data collection technique in which each of the potential respondents is asked to answer exactly the same set of questions in a predetermined order (Saunders et al. 2009).

Kumar (2011) identifies the following advantages and disadvantages of collecting data by means of questionnaires:

- Advantages
  a) It is an inexpensive method of obtaining information.
  b) It provides a high degree of anonymity.
  c) The quality of the data obtained does not depend on any form of personal interaction.

- Disadvantages
  a) The presence of self-selecting bias.
  b) It does not possess the opportunity to clarify issues.
  c) Spontaneous responses are not allowed for.
  d) The possibility exists that respondent may consult with others.
  e) It generally has a low rate of response.

Observational data collection, along with survey data, forms part of descriptive research and is a manner by which people or situations are observed with the objective of obtaining information on the behaviour of people or objects. This is done without any verbal contact between the researcher and the participant under scrutiny (Wilson 2008). Observational data is categorised by Delbridge and Kirkpatrick (1994) as being primary, secondary or experiential in nature:

- primary observations occur where the researcher takes note of what happens or is said at the time;
- secondary observations are formal statements by observers of what had occurred; and
- experiential observations are data on the perceptions and feelings of the researcher while observing the participants.

Saunders et al. (2009) identify a list of possible advantages and disadvantages when applying observations as formal data collection technique. This is summarised in Table 8.3.

Table 8.3 Advantages and disadvantages of observations

Advantages	**Disadvantages**
Good explanatory function in social situations	Time-consuming exercise
Researcher's awareness of social processes heightened	Occurrence of difficult ethical dilemmas for researcher
Useful for researchers working within own organisation	Observer bias
First-hand experience of participant emotions	Demanding method of obtaining data
Usefulness of all data collected	Possibility of role conflict (colleague vs. researcher)
	Difficulty in obtaining access to organisations
	Difficulty of data recording for researcher

Source: Saunders et al. (2009)

Experimental data collection forms part of causal research and is a method whereby the researcher intervenes or manipulates a variable in order to observe the resultant change in another variable (Kumar 2011). In other words, the purpose of an experiment is to study causal links whereby a change in an independent variable produces a change in a dependent variable (Hakim 2000).

Since the objective of data collection (with reference to this study) was to examine certain perceptions and opinions of stakeholders in the corn futures market with reference to trading strategies and market phenomena, it was decided that a survey would prove to be the best data collection mechanism. The decision on whether to collect information through interviews or questionnaires was only done after considering the following data collection criteria as defined by Kumar (2011):

- the nature of the investigation;
- geographical distribution of the study population; and
- the type of study population.

For the purposes of this study, a structured questionnaire was preferred to interviews as survey instrument in order to obtain and collect information from the sample population.

This decision was taken as the potential respondents were scattered over a wide geographical area and individual interviews would prove to be extremely expensive. In addition, the study population possessed sufficient knowledge to provide a satisfactory response on the questionnaire and as such it was favoured as data collection tool for the particular study.

8.4.5 Data measuring

Data measuring, according to Stevens (1951), involves the assignment of numbers (according to fixed rules) to either individuals or objects with the objective of reflecting differences between them with regard to a certain characteristic or attribute.

According to Welman and Kruger (2001), different levels of measurement can be distinguished based upon the following four characteristics of numbers assigned in the process:

- distinguishability;
- order of rank;
- equal intervals between successively higher numbers; and
- absolute size.

As such, four different scales of measurement can be identified, namely nominal data, ordinal data, interval data and ratio data. Each of these will be briefly discussed for explanation purposes.

8.4.5.1 Nominal data

With regard to nominal data, or otherwise known as descriptive data, numbers are used only to identify different categories of people, objects or entities (Leedy & Ormrod 2010). With this type of measurement, individuals are placed in different, mutually exclusive and exhaustive categories in respect of the attribute being measured (Welman & Kruger 2001).

A limited number of statistical procedures are deemed appropriate for the analysis of nominal data. These include the mode, which indicates the most frequently occurring category within the data set, as well as the chi-square test, which is used to compare relative frequencies (Leedy & Ormrod 2010). Since statistics such as the mean and

variance cannot be computed with regards to nominal data, only non-parametric statistical tests can be applied.

8.4.5.2 Ordinal data

Ordinal data, also referred to as ranked data, are data whose values cannot be measured numerically but which can be placed in a definite order. Rating or scale questions, where the respondent is confronted with the question of rating the extent to which a statement is agreed with, fall within this scope (Saunders et al. 2009).

The assumption with ordinal data is that questions to which a higher number is assigned, exhibit more of the specific attribute or characteristic than lower assigned numbers (Welman & Kruger 2001). A classic example of this form of data measurement is that of respondents being asked to confirm their opinion about a particular topic, based upon the following alternatives:

1 = strongly agree
2 = somewhat agree
3 = somewhat disagree
4 = strongly disagree.

Leedy and Ormrod (2010) identify the inability of ordinal data measurement to provide an exact estimation of the difference between the alternatives as a major shortcoming.

By using an ordinal scale of data measurement, the possible range of statistical techniques, which can be applied to the data obtained, is expanded (Leedy & Ormrod 2010). In addition to non-parametric analysis (as is the case with nominal data), the researcher is also able to determine the median of the set of data. In addition, a percentile rank can be used to identify the relative position of a single item within the group, and Spearman's rank order correlation can determine the extent of the correlation between any two characteristics.

8.4.5.3 Interval data

Through interval data, the researcher applies the property of equal differences between consecutively higher numbers (Welman & Kruger 2001). Interval data measurement possesses all of the characteristics of an ordinal scale, but has an additional unit of

measurement, which enables individuals or responses to be placed at intervals equally spaced in relation to the spread of the measurement scale. As such, the interval scale consists of a starting and terminating point and is divided into equally spaced intervals or units of measurement. The starting point, terminating point and number of intervals are arbitrary and may vary between scales (Kumar 2011).

By applying an interval scale in data measurement, the researcher obtains the ability to apply certain statistical analyses, which are not possible with nominal or ordinal data. Since the interval scale reflects equal distances between adjacent points, any statistics which are calculated by means of the mathematical equations of addition or subtraction can be applied. These include the mean, standard deviation and Pearson product moment correlations of the data. Thus, parametrical statistical analysis applies to interval data measurement (Leedy & Ormrod 2010).

8.4.5.4 Ratio data

Ratio data measurement encompasses all the properties exhibited by nominal, ordinal and interval data. In addition to this, ratio data also has its own unique characteristic whereby the zero point of the scale is fixed, meaning that it has a definite identifiable starting point (Kumar 2011). In economic terms, it is therefore an absolute scale and since the difference between the intervals is always measured from a starting point of zero, any arithmetical operations can be performed on the data.

Leedy and Ormrod (2010) provide a summary of the alternative measurement scales, their characteristics and statistical implications. This is presented in Table 8.4.

Table 8.4 Measurement scales, their characteristics and statistical implications

Measurement scale	Characteristics	Statistical possibilities
Nominal scale	Scale measures in terms of names, designations or discrete units or categories.	Mode, percentage values or chi-square
Ordinal scale	Scale measures in terms of values without specifying the size of intervals.	Nominal possibilities plus median, percentile rank and rank correlation
Interval scale	Scale measures in terms of equal intervals whose zero point is arbitrarily established.	Ordinal possibilities plus mean, standard deviation, product moment correlation and most inferential statistical analyses
Ratio scale	Scale measures in terms of equal intervals and an absolute zero point of origin.	Interval possibilities as well as geometric mean and percentage variation Researcher can conduct virtually any inferential statistical analyses.

Source: Leedy & Ormrod (2010)

The current study focused predominantly on ordinal- and ratio measurement as units of analysis.

- Ordinal measurement questions (rating questions) are designed with the objective of collecting opinion data. These types of questions often make use of the Likert-type rating scale through which respondents are required to indicate their level of agreement/disagreement with regard to a statement or series of statements (Saunders et al. 2009). A general example is found where respondents are asked to rate the extent to which they agree to a certain statement or series of statements. The options presented follow a logical sequence such as “disagree”, “tend to disagree”, “not sure”, “tend to agree” and “agree”. In addition, a number of list questions are presented to respondents. List questions are useful when the researcher needs to be certain that the respondent has considered all possible responses. The response categories include “yes/no”, “agree/disagree” and “applies/does not apply”.
- Ratio measurement questions are presented to respondents in order to collect behaviour or attribute data (Saunders et al. 2009). This is often presented by way of quantity questions, which give the amount or degree of a characteristic. The data collected can also be termed ‘self-coded’, since respondents code themselves by answering the question.

8.4.6 Pretesting for validity and reliability

Whenever a measuring device is used as part of the data collection process, the validity and reliability of the device are important to the overall success of the study. Since the researcher depends on the results to show support or lack of support for the theory, the measurement device used for the research project should truly measure what it is intended to. Erroneous data collection methods will therefore result in an erroneous data analysis. Thus, validity and reliability need to be pre-tested as they demonstrate and communicate the rigour of the research process and the trustworthiness of the research findings (Roberts, Priest & Traynor 2006).

In order to obtain the desired level of validity and reliability, there are four stages to be adhered to. These stages are depicted graphically in Figure 8.5.

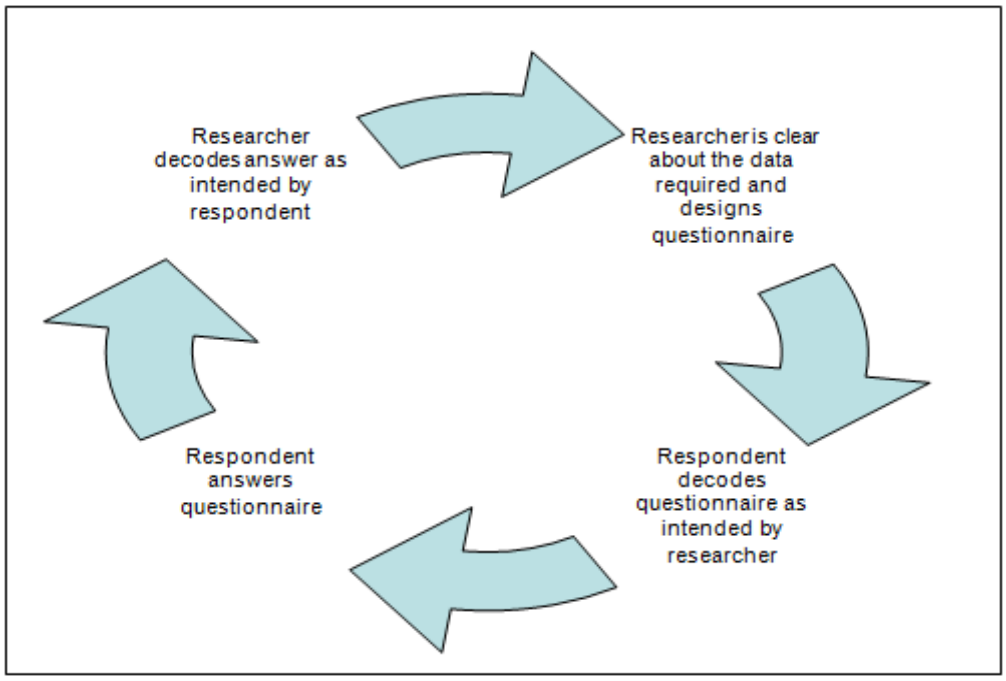

Figure 8.5 Four stages of survey questionnaire required to ensure validity and reliability

Source: Foddy (1994)

According to Saunders et al. (2009), the validity and reliability of the information obtained by means of a survey questionnaire depend to a large extent on:

a) the design of the questions;
b) the structure of the questionnaire; and
c) the rigour with which pilot testing is done.

For the purposes of this study, the survey questionnaire was pre-tested in order to determine its validity and reliability before actual presentation to respondents.

8.4.6.1 Validity

The validity of a questionnaire refers to the ability of the assessing instrument to measure what it is intended to and therefore the findings of the questionnaire should represent the reality of what is being measured (Punch 1998). In other words, validity refers to the accuracy, meaningfulness and credibility of the research project as a whole, since the research project will only be considered worthwhile if the researcher is able to draw defensible conclusions from the data obtained (Leedy & Ormrod 2010).

When considering the validity of a research study, it is important to determine whether the study has sufficient controls which will ensure that the conclusions derived are truly warranted by the data. In addition, it is necessary to contemplate whether generalisations can be made regarding the observations derived from the research situation (Leedy & Ormrod 2010). These issues are addressed through an investigation into the internal validity and external validity of the research project.

According to Saunders et al. (2011), internal validity refers to the extent to which findings can be attributed to interventions rather than to flaws in the research design. Thus, internal validity is concerned with the reality of what is being measured. Although internal validity also focuses on the possibility of alternative explanations for causal relationships between variables, the study did not take this into account as it did not investigate causal relationships.

External validity is concerned with the effectiveness by which a research project enables the user to predict the course of events in other times and places. Generalisation is the key to this, as a study or project will only possess external validity when the findings can be applied to other situations (Welman & Kruger 2001).

According to Cooper and Schindler (2008), four distinctive validity classifications can be made. These include face validity, content validity, criterion validity and construct validity.

- ‘Face validity’ is the extent to which an instrument looks like it is measuring a particular characteristic. This is particularly useful in ensuring cooperation from participants in the study (Leedy & Ormrod 2010).
- ‘Content validity’ determines the extent to which statements or questions accurately represent the issue it is supposed to measure, as judged by experts in the field (Kumar 2011).
- ‘Criterion validity’, also known as ‘predictive validity’, determines the ability of the questions to make accurate predictions. In the assessment of criterion validity, the researcher compares data obtained from the questionnaire with that specified in the criterion (Saunders et al. 2011).
- ‘Construct validity’ represents a characteristic which is measured by an instrument, with such characteristic being unable to observe but is assumed to exist based upon patterns of behaviour.

The measuring instrument (questionnaire) is occupied with measuring the attitude of respondents in mitigating price volatility. As a result, face and content validity are judged to be the most appropriate measures of validity and they were tested by way of a pilot study among stakeholders actively trading on the futures market for soft commodities.

Validity on its own is not enough to justify the effectiveness and acceptability of a questionnaire. This can only be achieved once reliability enters the picture.

8.4.6.2 Reliability

Reliability is a measurement of the robustness of the measuring instrument and determines whether the questionnaire will produce consistent findings at different times and under different conditions (Saunders et al. 2009). This means that reliability is actually synonymous with the consistency of a test, survey or observation. If the research tool is stable and provides consistent findings, it is said to be reliable. The greater the degree of stability and consistency experienced, the greater the actual reliability. According to Kumar (2011), there are a number of methods which can be used to determine the reliability of an instrument. These methods can be classified as either external consistency procedures or internal consistency procedures.

External consistency procedures compare the findings of two independent processes of data collection with each other in order to verify the reliability of the measure. This can be achieved through either the test/retest method or through the parallel test method.

- The test/retest method is a commonly applied method to determine the level of reliability of a research tool. This is achieved by correlating data initially collected with data collected at a later stage from the same assessment instrument under as near equivalent conditions as possible (Saunders et al. 2009). The ratio between the test and retest scores will provide an indication as to the reliability of the instrument. Greater values confirm higher levels of reliability, while smaller values confirm lower levels of reliability. The equation for this procedure can be summarised as follows:

  (Test score)/(Retest) = 1

  or

  (Test score) – (Retest) = 0

  A ratio of 1 indicates 100% reliability, with any deviation confirming a lower level of reliability. Similarly, a zero difference between the test/retest scores correlates to a 100% reliability level. A bigger difference confirms a lower level of reliability.
- The parallel test method is constructed through the application of two instruments which are intended to measure exactly the same phenomenon. These instruments are administered to two similar populations after which the results obtained from the populations are compared to each other. Similar feedback confirms reliability (Kumar 2011).

The background regarding the application of internal consistency procedures entails that items or questions measuring exactly the same phenomenon should, if they ought to be reliable, produce similar results irrespective of their number or sequence in an instrument. As such, the researcher can randomly select questions from the pool in order to test the reliability of the instrument and each segment of questions should reflect reliability to approximately the same extent. Logic entails that if a question is an indicator of some aspect of a phenomenon, each segment constructed will reflect different aspects of the phenomenon even if it is based on fewer questions (Kumar 2011). Roberts et al. (2006) identified the split-half test and statistical procedures such as Cronbach's alpha coefficient and the Kuder-Richardson formula 20 as methods for assessing internal consistency and reliability.

- The split-half test is designed with the objective of correlating half of the items with the other half. This method is appropriate for instruments designed specifically to measure attitudes towards a phenomenon. The methodology regarding the split-half test is as follows (Roberts et al. 2006):
  - The researcher randomly splits all of the responses to a question into two groups.
  - The scores of the two groups of data sets are totalled.
  - Once this has been completed, the correlation between the two data sets is calculated. The Pearson formula is used for this action.
  - Should it be deemed necessary, the correlation can be adjusted to increase reliability. This is achieved through the Spearman-Brown formula.
  - Reliability in this instance is defined as the proportion of variability in a measured score that is due to variability in a true score (Roberts et al. 2006). A reliability of 0.9 can be interpreted as 90% of the variability in the observed score being true whereas 10% can be attributed to error.
  - A reliability of in excess of 80% is recommended for research purposes.
- An approach more sophisticated than the split-half test is Cronbach's alpha. This test for reliability is an estimated average of all the split-half estimates of reliability (Roberts et al. 2006).
- The Kuder-Richardson formula 20 is similar to Cronbach's alpha in that it represents an average of all possible split-half estimates. The difference between the two methods resides in its application. While Cronbach's alpha is typically applied during scale development with items encompassing several response options, the Kuder-Richardson formula 20 estimates reliability for dichotomous response scales (i.e. Yes/No).

  The Kuder-Richardson formula 20 is calculated as follows (Kuder & Richardson 1937):
  $KR20 = N/(N - 1)[1 - sum(p^x q^x)/Var(X)]$
  where $sum(p^x q^x)$ = the sum of the product of the probability of alternative responses.

After careful thought and considering all of the alternative methods for assessing reliability, the test/retest method was chosen as the appropriate method for testing the reliability of the measuring instrument. The following section focuses on constructing the research sample for the study undertaken.

8.5 THE RESEARCH SAMPLE

A specific population usually underlies a research problem. The study object or population may include (but is not limited to) any of the following: individuals, groups, organisations or the conditions to which these study objects are exposed (Welman & Kruger 2001). The sheer size of such a population may prove to be of such magnitude that an attempt to involve all of the individual components within the population will be rendered impractical or uneconomical (Botha 2005).

In order to prevent the costly and time-consuming exercise of including all of the components within the population in the research study, data are rather obtained from a sample of the total population with characteristics similar to the population as a whole. This is known as sampling, and can be defined as the process by which certain entities are selected from the broader population in order to collect relevant data with the objective of meeting the research objectives (Leedy & Ormrod 2010). Therefore, sampling involves the types and number of respondents which will be included in the research project, as well as the method by which the individual components from the broader population will be selected (Zikmund et al. 2010; Kumar 2011).

8.5.1 The sample and target population

The target population is known as the group consisting of specific elements or members who are relevant to the research being conducted (Zikmund et al. 2010). Since the researcher aimed to contest the efficient market hypothesis for the CBOT corn futures contract, it was deemed important to include all market participants actively trading on the futures market in the target population. This entailed that all long position traders (processors and speculators) and short position traders (producers and speculators) were considered as the target population. These stakeholders were responsible for all volumes of futures and options contracts as traded on the corn futures market.

Due to the vast numbers of active corn traders in the futures market, it proved to be an impossible and futile exercise to include all of these stakeholders in the research project. As a result, it was necessary to draw a representative sampling frame consisting of elements from which the research sample would actually be drawn (Cooper & Schindler 2003).

8.5.2 The sample size

The sample size of a research study refers to the number of elements from which the relevant data is to be obtained, and is often denoted by the letter *n* (Kumar 2011). The size of the selected sample has a major impact on the quality of the conclusions drawn as well as the ability of the researcher to generalise the information to the population as a whole. It has been noted that samples should preferably consist of no fewer than 15 units of analysis (Huysamen 1991).

Welman and Kruger (2001) identified the following factors which should be considered when deciding on the sample size:

- the size of the population should determine the size of the sample: larger populations require larger samples while smaller populations require smaller samples;
- larger heterogeneity of variables require larger samples;
- should each stratum of a heterogeneous population be relatively homogeneous, a smaller sample may be required;
- it is important to accept that the number of units of analysis from which data are ultimately obtained may be substantially smaller than the number that was drawn originally.

Due to the complexity of the current research, as well as time constraints in completing the project, only 40 respondents were included in the sample. The respondents were divided into segments to make provision for all market participants to be represented in the sample. The numbers of each segment of respondents included in the research sample were as follows:

- Producers 24
- Processors 8
- Speculators 8

  Total 40

8.5.3 Types of research samples

Two broad types of research samples can be distinguished, namely probability samples and non-probability samples (Welman & Kruger 2001; Sekaran 2003; Saunders et al.

2009). The categorisation of these research samples as well as their individual components is illustrated in Figure 8.6.

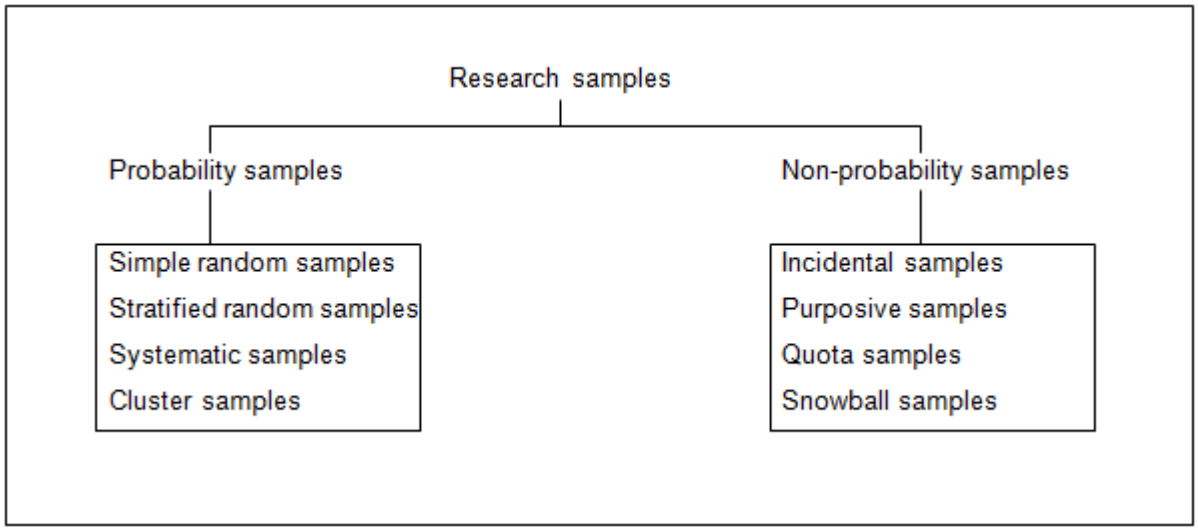

Figure 8.6 Categorisation of research samples

Source: Sekaran (2003)

8.5.3.1 Probability sampling

Probability sampling is a selection of sampling techniques in which the probability of each component being selected from the broader population is known (and not zero) (Saunders et al. 2009). As such, the probability of inclusion of an individual element from the larger population in the eventual research sample can be determined.

Through probability sampling, the probability with which the potential results from the sample can differ from the corresponding population means can be calculated or indicated. According to Welman and Kruger (2001), probability samples can be classified as follows:

a) simple random samples;
b) stratified random samples;
c) systematic samples; and
d) cluster samples.

a) Simple random samples

Simple random sampling is commonly referred to as unrestricted sampling (Botha 2005). It is the most popular method by which a probability sample is drawn and is highly correlated with the concept of randomisation, whereby each element in the population has an equal and independent chance of selection (Kumar 2011).

Figure 8.7 illustrates the procedure by which a simple random sample is drawn.

Step 1	Identify by a number all elements or sampling units in the population
Step 2	Decide on the sample size *n*
Step 3	Select *n* through an acceptable method (such as a table of random numbers or a computer program)

Figure 8.7 Procedure for selecting a simple random sample

Source: Kumar (2011)

b) Stratified random samples

Stratified random sampling is applied where the specific population is composed of more than one subpopulation, which is recognisable and non-overlapping and which differs from one another in terms of the variable (Welman & Kruger 2001). The representation of every sub-population in the sample is determined, and elements within the sub-population are randomly chosen for presentation in the sample (Botha 2005). In other words, the researcher attempts to stratify the population in such a manner that the population within a stratum is homogeneous with regard to the characteristic on the basis of which it is being stratified.

Leedy and Ormrod (2010) state that two types of stratified random sampling can be identified, namely proportionate stratified sampling and disproportionate stratified sampling. Proportionate stratified sampling involves the selection of a number of elements from each stratum in relation to its proportion in the total population. Disproportionate stratified sampling does not consider the size of the stratum. Figure 8.8 illustrates the procedure by which a stratified random sample is drawn.

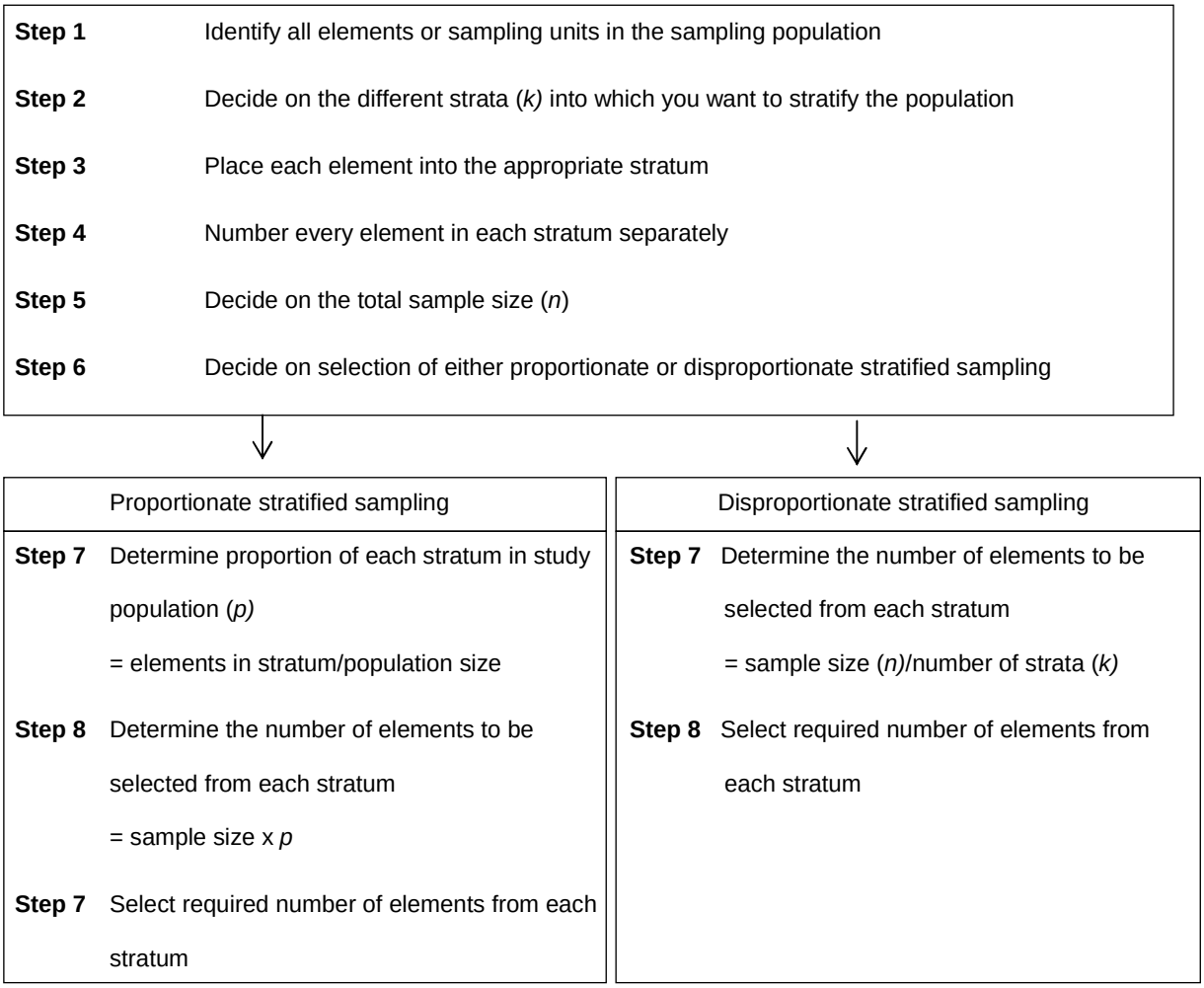

Figure 8.8 Procedure for selecting a stratified random sample

Source: Kumar (2011)

c) Systematic samples

The process of systematic sampling involves the random selection of an initial starting point, after which the elements are selected at regular intervals (Saunders et al. 2009). Stated otherwise, in the instance where a sample of *n* members is required from a population of N elements numbered from 1 to N, every N/*n*th element is included in the sample (Welman & Kruger 2001).

Systematic sampling is often referred to as a mixed sampling design as it exhibits characteristics of both random and non-random sampling designs (Kumar 2011). Figure 8.9 illustrates the procedure by which a systematic sample is drawn.

Step 1	Prepare a list of all the elements in the study population (*N*)
Step 2	Decide on the sample size (*n*)
Step 3	Determine the width of the interval (*k*) = total population/sample size
Step 4	Select an element from the first interval (*n*th order)
Step 5	Select the same order element from each subsequent interval

Figure 8.9 Procedure for selecting a systematic sample

Source: Kumar (2011)

d) Cluster samples

Cluster sampling acknowledges the fact that it is impossible to obtain information on all members in large-scale surveys. As a result, a pre-existing list of heterogeneous groups, also known as clusters, is drawn and every member of the particular cluster is included in the sample (Welman & Kruger 2001).

8.5.3.2. Non-probability sampling

Non-probability sampling does not adhere to the theory of probability when selecting elements from the sampling population. It is known by the characteristic that certain subsets of the population have little or no chance of eventually being included in the sample. Therefore the probability of an element chosen in the sample cannot be specified (Tustin et al. 2005). The eventual inclusion in the research sample drawn is dependent upon other considerations. Welman and Kruger (2001) classify non-probability sampling as follows:

a) accidental (convenience) sampling;
b) purposive (judgemental) sampling;
c) quota sampling; and
d) snowball sampling.

a) Accidental (convenience) sampling

Accidental (convenience) sampling is a method whereby elements are chosen from a population for research purposes based on availability and/or accessibility. It is the most convenient sampling method since members who are near and available are included in the sample (Tustin et al. 2005). Accidental sampling is therefore an easy way to obtain

relevant information efficiently, effectively and within a relatively short period (Sekaran 2003).

Accidental sampling is also known for including elements without a specific prerequisite for certain obvious and visible characteristics (Kumar 2011).

b) Purposive (judgemental) sampling

Purposive sampling is commonly regarded as the most important method of non-probability sampling (Welman & Kruger 2001). Elements are included in the research sample for a particular purpose, with the condition that the chosen elements are typical of the population and represent diverse perspectives on an issue. This may prove to be very appropriate for specific research problems (Leedy & Ormrod 2010). As a result, the sample is chosen intentionally with the objective of addressing the research problem.

This method of constructing a research sample relies heavily on the experience and ingenuity of the researcher to obtain sample units in such a way that the units are recognised as indeed being representative of the total population (Welman & Kruger 2001). Purposive sampling is often used when working with small samples and the researcher wishes to include an element on the basis that it will be exceptionally informative (Neuman 2005).

It is important, however, that the researcher shouldalways attempts to provide a rationale or valid explanation for the reasons why particular individual participants are chosen for the research sample.

c) Quota sampling

Quota sampling is a non-probability sampling technique, which ensures that the chosen sample represents certain aspects or characteristics of the population chosen by the researcher (Saunders et al. 2009). An effort is thus made to ensure that the sample consists of similar proportions of units in important areas. The units are accidentally obtained in the relevant areas (Welman & Kruger 2001).

Although this is the least expensive method of obtaining a sample, the results cannot be generalised to the total population since the chosen elements may possess individual characteristics unique to themselves (Kumar 2011).

d) Snowball sampling

Snowball sampling entails individual members of the target population being approached with the objective of identifying additional members to be included in the sample (Welman & Kruger 2001). This technique is considered appropriate in the instance where it is difficult to identify individual members of the desired population or when initial contact proves to be problematic (Saunders et al. 2009).

The respondents selected for the purpose of the research sample in the current study were selected through a process of non-probability sampling. In particular, purposive (judgemental) sampling was applied to select the members of the population. This sampling technique was applied since it was deemed appropriate due to the following reasons:

- the researcher had more than a decade of experience on trading soft commodity futures contracts and was therefore able to identify respondents who might be regarded as being representative of the relevant population;
- the confidentiality of information required by the questionnaire would result in a low level of response should probability sampling be applied;
- purposive sampling allowed for approaching potential respondents who could provide the best possible information pertaining to the research project; and
- in terms of the current study, this method of sampling was time-effective.

Saunders et al. (2009) note that four types of purposive sampling techniques can be distinguished:

- deviant sampling is used in unusual or special cases where data collected will enable the researcher to meet objectives on the extreme scenarios;
- maximum variation sampling allows the researcher to collect data which can identify, describe and explain key themes, and the presence of any patterns will prove to be of particular interest and may actually represent the key theme of the study;
- homogeneous sampling focuses on information obtained from a single group;

- critical case sampling involves the collection of data in critical cases with the objective of making a dramatic conclusion; and
- typical case sampling provides an illustrative profile by using a representative case.

Maximum variation sampling as a component of non-probability purposive sampling was applied in the current study, as it was necessary for the research project to determine whether an observable pattern was recognisable in the attitude and price risk management performance of alternative groups of stakeholders in the corn futures market. The existence of such a pattern would prove to be of utmost importance and represented the underlying theme of the research conducted.

Patton (2002) notes that it is necessary to identify characteristics or sample selection criteria pertaining to the potential respondents before engaging in the selection of the sample. For the purpose of this research, the conditions upon which a potential respondent could be included in the sample can be summarised as follows:

- producers were required to produce in excess of 5 000mt of grain on an annual basis;
- processors were required to consume in excess of 10 000mt of grain on an annual basis; and
- speculators had to be active on the market.

Table 8.5 defines the list of actual respondents per trading sector.

Table 8.5 List of actual respondents per trading sector

Producers	AB Pienaar Alderus Boerdery Bresler Boerdery Cornelia Boerdery EP Blignaut GH Meiring Helm Broers Boerdery JI Cronje JM de Beer Mooitoekoms Graan BK NJ van Zyl Boerdery Nuwedeel Boerdery Reynders Broers en Seuns Robyn Boerdery SJS van Zyl Boerdery (Edms) Bpk Tweedraai Beleggings WCE du Plessis
Processors	JN Milling LFC Meule Sardinia Milling SJS van Zyl
Speculators	Corn International Pharos Consulting RMD Silostrat (Pty) Ltd

The respondents from the target population included personnel involved either directly or indirectly in the price risk management of futures contracts. These personnel included:

- owners;
- financial managers;
- procurement managers; and
- market advisory services.

The next section will focus on the process of gathering data. This is an important phase in the business research process as it details the mechanism by which data is obtained. The effectiveness of data gathering will eventually influence the quality of the data derived.

8.6 GATHERING THE DATA

The process of gathering data, also known as the fieldwork stage, starts once the sampling plan as set out in stage three has been finalised and formalised. Data gathering entails all of the actions involved in collecting information with the objective of addressing the research problem. Depending on the assessment instrument used in compiling information, the actual data gathering can be done either by human observers or by machines (Zikmund et al. 2010).

As discussed in section 8.4.4, a questionnaire was decided on as the most appropriate survey method to conduct primary research.

8.6.1 The questionnaire

According to Malhotra (1993), careful planning should precede the development and completion of a questionnaire. Saunders et al. (2009) provide the following guidelines for designing a questionnaire which, will enhance response rates, validity and reliability:

- design individual questions in a careful and precise manner;
- ensure the questionnaire has a clear and pleasing layout;
- provide a lucid explanation on the purpose of the questionnaire;
- engage in pilot-testing; and
- carefully plan and execute relevant administration regarding the questionnaire.

Foddy (1994) stipulates that all questions must be presented in such a way that it would be understood by the respondent in the manner as intended by the researcher, while the response must be understood by the researcher exactly as intended by the respondent.

8.6.2 Types of questionnaires

The design of a questionnaire may differ according to the way in which it is administered, as well as the amount of personal contact entered into between the researcher and the respondent. Figure 8.10 sets out the different types of questionnaires available to researchers.

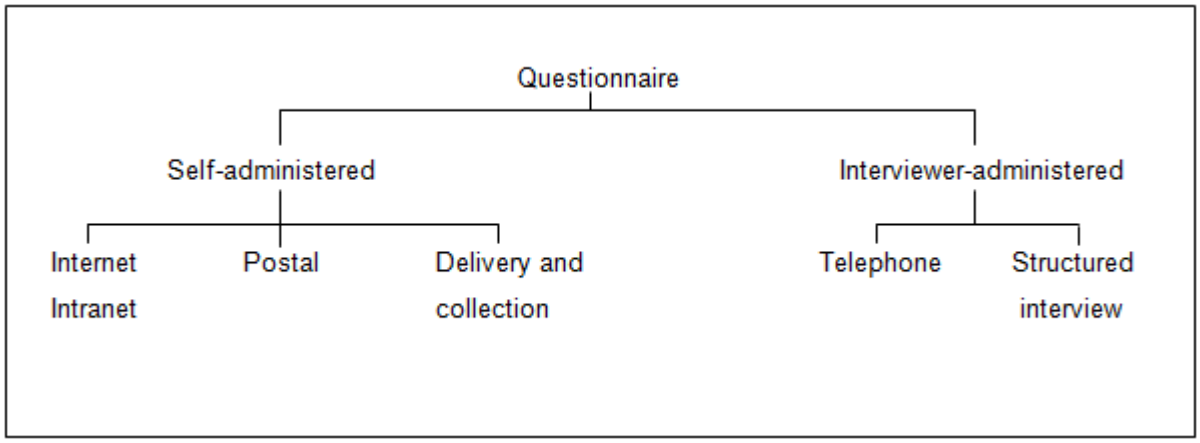

Figure 8.10 Types of questionnaires

Source: Saunders et al. (2009)

- Self-administered questionnaires are completed by the respondents themselves. This type of questionnaire is administered either electronically via an internet-mediated questionnaire/intranet-mediated questionnaire, or posted to respondents or delivered by hand to and again collected from the respondents (Saunders et al. 2009).
- Interviewer-administered questionnaires are recorded by the interviewer on the basis of the response received from each respondent. According to Saunders et al. (2009), this can be administered by means of telephonic conversations (telephone questionnaires) or structured interviews where the researcher physically meets the respondents in order to personally conduct the interview.

According to Witmer, Colman and Katzman (1999), questionnaires should be formulated and administered in a manner that will enhance control regarding the response received. The following factors will guide the researcher to the optimum questionnaire type or structure applicable to the study concerned:

- the characteristics of the respondents from which data is to be collected;
- the importance of reaching a specific person within an organisation as potential respondent;
- the likelihood of respondents' answers being contaminated or distorted;
- the type of questions which need to be answered in order to reach the objective; and
- the number of proposed questions.

For the purposes of this study, a self-administered, internet-mediated questionnaire was provided to all potential respondents. This was decided on as the optimal data collection

method since it would ensure that the appropriate person within the organisation was targeted. As the questionnaire was addressed to a specific person (via e-mail) and not in general terms, the likelihood that a contaminated response would be received was miniscule. The relatively short questionnaire and lack of any complicated questions further promoted the use of the internet-mediated version (Oppenheim 2000).

8.6.3 Design of questions incorporated into questionnaire

The design of each question incorporated into the questionnaire is determined by the information which the researcher needs to collect. In the instance where the findings of the study will be replicated or compared with that of another study, questions may be adopted or adapted (Saunders et al. 2009). For the purposes of this study, original questions were developed and formulated with the objective of obtaining a response which would align the questionnaire with the initial research objectives. As such, the questionnaire was structured categorically, with each segment aiming to achieve a certain objective. These objectives can be summarised as follows:

- Financial exposure

  The first segment of the questionnaire aimed to determine the level of financial exposure to market movement experienced by stakeholders.
- Price volatility and forecastability

  Determining the level of price volatility as experienced by stakeholders was the primary objective of this segment. In addition, the segment aimed to determine the underlying manner by which trading decisions are taken as well as the success by which prices can be forecasted.
- Trading strategies

  It was important to evaluate the strategies implemented by traders in mitigating price risk and volatility. The third segment had the objective of evaluating the composition of these strategies.
- Benchmark and proposed methodology

  The penultimate segment focused on determining the benchmark against which stakeholders evaluate trading performance, as well as their knowledge on price risk management methodologies which exhibit certain characteristics.

- Feasibility of proposed methodology

  The proposed price risk management methodology could only be implemented given certain conditions. This segment aimed to determine whether stakeholders adhere to these conditions. If not, the methodology was not feasible.

Zikmund (1997) identifies six factors with which a researcher should comply in order to construct clear and tailor-made questions:

a) avoid complexity;
b) refrain from leading or loaded questions;
c) ensure that questions are not ambiguous;
d) avoid double-barrelled questions;
e) avoid making assumptions; and
f) state questions in a manner that will allow the respondent to complete the questionnaire the shortest possible time.

Questions within an assessment instrument are classified as either open or closed in nature. Open questions are characterised by respondents having to formulate answers by themselves. Such questions are generally used in in-depth and semi-structured interviews (Welman & Kruger 2001). This type of question will therefore be especially useful when the researcher is unsure of the potential response or when a detailed answer is needed. Closed questions have a list of possible answers set out in the questionnaire with the respondent only having to indicate the most appropriate answer (Kumar 2011). This type of question ensures that the actual information needed by the researcher is obtained and also allows for an easier analysis.

Even though the current study was complex in nature, the assessment instrument designed with the objective of collecting information was short and compact, which allowed for the rapid collection of relevant information. The formulation of the questions served as a basis upon which the respondents' attitude towards price risk management could be identified and analysed. For the purposes of this study, closed questions were used for the following reasons:

a) simplicity allowed respondents to complete the questionnaire in the absence of the researcher;

b) questions were specific, which allowed the researcher to obtain only relevant information; and
c) closed questions generally resulted in rapid responses.

As the objective of the study was to analyse the price risk management performance of market participants in the corn futures price contract with the aim of developing a pricing methodology which would ultimately contest the efficient market hypothesis, measurement questions were used under the category of closed questions in the assessment. These included the following:

a) list questions – the respondent was provided with a series of responses from which any could be chosen (e.g. yes/no; agree/disagree; applies/does not apply);
b) category questions – each respondent's answer could only fit one category; and
c) ranking questions – the respondent needed to place alternative factors in rank order.

8.6.4 Structure of questionnaire

The layout of a self-administered questionnaire should be attractive enough, but also simple enough, to encourage potential respondents to complete and return the assessment instrument. Dillman (2007) states that the structure of a questionnaire generally consists of:

a) a covering letter explaining the purpose of the survey;
b) an introduction explaining concisely the reasons as to why the respondent is required to complete the questionnaire;
c) the relevant questions; and
d) instructions which details the actions needed to be taken by the respondent in order to return the completed assessment.

8.6.5 Choice of measuring scale

As discussed in section 8.4.5, the study made use of predominantly ordinal- and ratio measurements as units of analysis.

- Ordinal measurement questions (rating questions) are designed with the objective of collecting opinion data. The Likert-type rating scale was briefly discussed as one of the most popular rating scales developed to assess people's attitudes (Leedy & Ormrod 2010). List questions were also presented to respondents, as such questions are useful when the researcher needs to be certain that the respondent had considered all

possible responses. The response categories include “yes/no”, “agree/disagree” and “applies/does not apply”. (Saunders et al. 2009.)

- Ratio measurement questions were presented to respondents in order to collect behaviour or attribute data. Data collected by ratio measurement questions can be classified as self-coded, since respondents code themselves by answering the question (Saunders et al. 2009).

Nominal data can only be analysed statistically through the mode of the data set which indicates the most frequently occurring category within the set, as well as the chi-square test which is used to compare relative frequencies (Leedy & Ormrod 2010). As such, only non-parametric statistical tests can be applied. Ordinal data have the added benefit of an expansion in the possible range of statistical techniques which can be applied. In addition to non-parametric analysis (as is the case with nominal data), the median, percentile rank and Spearman’s rank order correlation can be calculated. Interval data collected possess all of the characteristics of an ordinal scale as well as any statistical analyses which are calculated through the mathematical equations of addition or subtraction. These include the mean, standard deviation and Pearson product moment correlations of the data. Thus, parametrical statistical analysis applies to interval data measurement (Leedy & Ormrod 2010). Ratio data encompasses all the properties exhibited by nominal, ordinal and interval data. In addition to this, any arithmetical operations can be performed on the data (Kumar 2011).

8.6.6 Pretesting the questionnaire

In order to ensure that respondents understand the questions within the assessment instrument and are able to follow the questionnaire format, a brief exploratory investigation needs to be done. This is known as pilot testing and involves the evaluation of particular procedures, measurement instruments and methods of analysis.

Pilot testing will also prove to be an effective mechanism by which the feasibility of the study can be determined, as it encompasses an examination of the reliability, validity and integrity of the questionnaire. In addition, the pilot study will identify particular factors omitted from the questionnaire and determine the need to adjust specific questions (Leedy & Ormrod 2010).

According to Zikmund et al. (2010), pilot testing should be applied on a specific group consisting of respondents with a makeup similar to that of the eventual respondents. Even though this may initially be a time-consuming exercise, pilot testing will ultimately save the researcher time in the long run as it is expected that the response will indicate quickly which approaches might not be effective in ultimately solving the research problem.

The pilot testing was completed by a sub-sample, which constituted 20% of the total number of respondents in the ultimate sample. The sub-sample could be categorised into different market participants, namely processors, producers and speculators. The respondents involved in the pre-testing exercise were required to complete the actual questionnaire as set out in Appendix II.

8.6.7 Validity

In the development and ultimate completion of the questionnaire, the researcher attempted to prove the validity of the assessment instrument through the concepts of face validity and content validity, as per discussion in section 8.4.6.1.

Face validity is the extent to which an instrument seems to be measuring a particular characteristic (Leedy & Ormrod 2010), and this was obtained through a review of the draft questionnaire by academic supervisors, as well as by a specialist in derivative trading on soft commodities, currently employed at Corn International. The feedback received on the draft questionnaire was incorporated and an adjusted questionnaire was developed.

Content validity determines the extent to which statements or questions accurately represent the issue they are supposed to measure, as judged by experts in the field (Kumar 2011). In order to measure the content validity of the actual questionnaire, a diagnostic questionnaire was required to be completed by the respondents identified in the sub-sample (Appendix III).

The feedback from the respondents in the sub-sample relating to the content validity of the actual questionnaire is presented in Figure 8.11.

Are the questions presented in a logical sequence?

Options	To no degree	To a lesser degree	To a fair degree	To a high degree	Totally	Average	Response count
	0	0	0	0	8	8	8

Was the objective of each question easily recognisable?

Options	To no degree	To a lesser degree	To a fair degree	To a high degree	Totally	Average	Response count
	0	0	0	0	8	8	8

Did you find any question to be ambiguous?

Options	Response per cent	Response count
Yes	0.00%	0
No	100.00%	8

Did all of the questions relate to your business environment?

Options	To no degree	To a lesser degree	To a fair degree	To a high degree	Totally	Average	Response count
	0	0	0	0	8	8	8

Are there any questions you would like to add to the questionnaire?

Options	Response per cent	Response count
Yes	0.00%	0
No	100.00%	8

Did the sensitivity level of any question prevent you from completing the questionnaire?

Options	Response per cent	Response count
Yes	25.00%	2
No	75.00%	6

How long did you take to complete the questionnaire?

	Response per cent	Response count
0–5 minutes	0.00%	0
5–10 minutes	62.50%	5
10–15 minutes	37.50%	3
15–20 minutes	0.00%	0

Figure 8.11 Results from diagnostic questionnaire

The feedback can be summarised as follows:

- all of the respondents indicated that the questions were presented in a logical sequence which flowed naturally from one question to another;

- the respondents agreed that the objective and aim of each question were easily recognisable and therefore they had no trouble in answering individual questions;
- no cases of ambiguity were reported by any of the respondents, which indicated that the questions were presented in a clear and straightforward manner;
- all of the respondents agreed that the questions were directly applicable to their business environment;
- no respondents indicated that they felt it was necessary to add any further questions;
- some of the respondents, concentrated in the processing sector, indicated that the questions were of such sensitivity levels that it prevented them from completing the questionnaire;
- respondents indicated that the questionnaire took from 5 minutes to 15 minutes to complete. On average, the respondents completed the assessment instrument in 10 minutes; and
- no alternative suggestions or comments were made.

Based on the feedback received regarding the content validity of the questionnaire, it could be concluded that the questionnaire was indeed valid.

8.6.8 Reliability

For the purpose of this research project, the test/retest method was chosen as the most appropriate measure of reliability. This method of testing for reliability created difficulties, as respondents had to be persuaded to complete the same questionnaire for a second time and this resulted in various reprimands. Eventually, a number of the questionnaires had to be completed by way of telephone confirmation the second time around. The researcher decided on this method of testing reliability on account of the following reasons:

- the futures market is a dynamic market in which price and volatility movement may result in stakeholders consistently changing their perceptions on some of the questions originally presented to them;
- upon first completion of the questionnaire, prices trended sideways, while an underlying bullish market was present during the second completion. The comparative feedback provided interesting results regarding the price risk management performance of stakeholders; and

- changes in market conditions and recent performance achieved through trading strategies could have altered the view of stakeholders on the need for a price risk management methodology. Confirmation of earlier feedback served as justification for the development of trading strategies to outperform predetermined benchmarks.

Of the 25 respondents who completed the first questionnaire, 17 provided feedback on the second questionnaire. The comparative results were processed and included in the equation stated below:

(Test score)/(Retest) = 1

A ratio of 1 indicates 100% reliability, with any deviation confirming a lower level of reliability. The ratio achieved by the research study equated to 98%, which confirms the presence of a high level of reliability.

8.7 PROCESSING AND DATA ANALYSIS

Once the data is obtained from the relevant respondents via a return e-mail with the completed questionnaire, stage five comes into consideration. This stage entails the processing and analysis of data gathered. Kumar (2011) explains this stage by means of a graph as depicted in Figure 8.12.

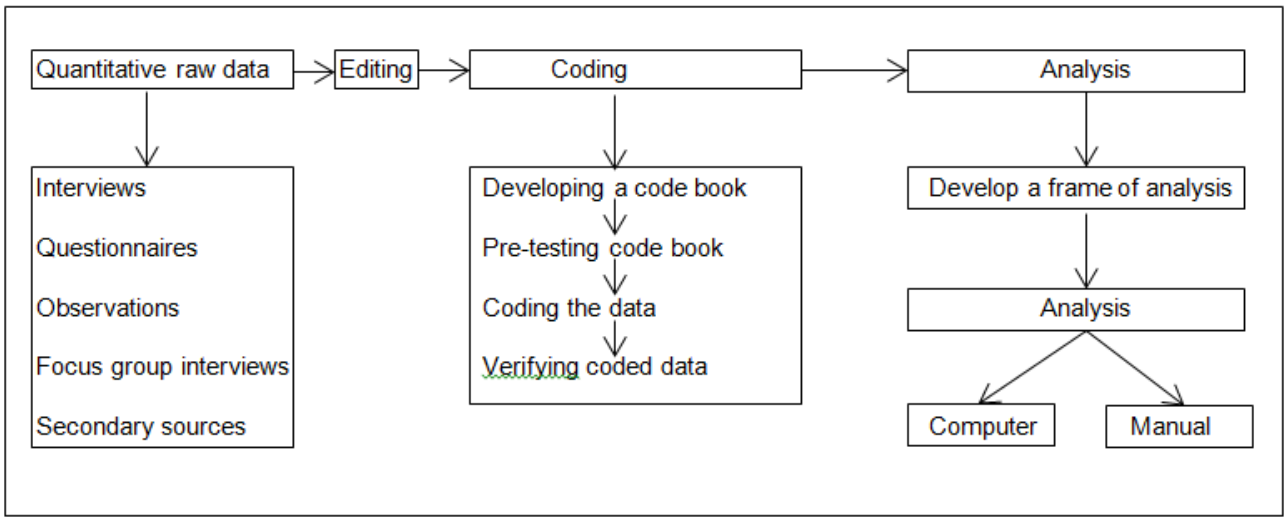

Figure 8.12 Steps in data processing and analysis

Source: Kumar (2011)

Raw, quantitative data in itself possess little meaning and are only of use once the data are processed into applicable and accurate information. Techniques such as graphs, charts and statistics are of importance in achieving this objective (Saunders et al. 2009).

- The first step in processing data is to ensure that it is free from any inconsistencies and incompleteness. This is done through an editing process, which Kumar (2011) defines as an attempt to identify and minimise errors, misclassification and gaps in data obtained from respondents by scrutinising the relevant research instruments. The editing process also allows for correcting any problems experienced as a result of an ineffective data collection method (Zikmund et al. 2010). This study attempted to reduce and eliminate any possible errors in the assessment instrument through feedback on the pilot testing and diagnostic questionnaire. The inclusion of key concepts in the actual questionnaire reduced the possibility of any misunderstanding by respondents.
- Once it is confirmed that the data obtained are free from any irregularities, the next step is to code the data through meaningful numerical or categorical processes (Saunders et al. 2009).
- The final step in the data processing stage is to actually understand and appreciate the meaning of the data collected. This is known as data analysis, and encompasses the three concurrent sub-processes of data reduction, data display and the drawing and verifying of conclusions (Saunders et al. 2009). The main aim of data analysis is to determine the existence of consistent patterns and to combine or summarise the details revealed in the research process.

This section will conduct a statistical analysis into the feedback received from the sample population by means of significance or hypothesis testing. It is important to compare the data collected through the assessment instrument with the realistic expectations of the researcher, and therefore significance testing is invaluable in assisting the researcher to rule out the possibility that the results achieved could actually be due to random variation in the sample.

8.7.1 Types of statistical analysis

According to Leedy and Ormrod (2010), statistics have two principal functions, namely to assist the researcher in describing data and drawing conclusions or inferences from the

relevant data. Based on this, statistical analysis can be divided into two distinctive units, descriptive statistics and inferential statistics.

8.7.1.1 Descriptive statistics

Descriptive statistics are tools which summarise the general nature of the data obtained, such as assessing how measured characteristics appear to be on average, the level of variability among different pieces of data and how closely two or more characteristics are interrelated.

8.7.1.2 Inferential statistics

In contrast to descriptive statistics, inferential statistics assist the researcher in making decisions on the data obtained. It is of particular use in determining whether differences observed between two groups or sets of data are large enough to be attributed to experimental intervention rather than pure coincidence.

8.7.2 Statistical analysis applied in research project

Statistical analysis procedures are of particular relevance in condensing an overwhelming body of data into presentable information in such a manner that it is easier to comprehend and deal with. Therefore, statistical analysis procedures actually help users of the information to see patterns and relationships which, due to the sheer magnitude of volume, might have gone unnoticed otherwise. In short, these statistical procedures help the human mind comprehend disparate data as an organised whole. It is consequently of immense importance to relate and define the specific statistical analysis procedures which are to be applied in the particular study accurately.

After thorough consideration and giving recognition to the benefits and disadvantages of each procedure, the following statistical procedures were chosen to be applied to the data obtained:

- graphical illustrations and simple frequency distributions;
- parametric and nonparametric analysis; and
- the Kolmogorov-Smirnov test.

Each of the statistical procedures is subsequently discussed in short in order to provide a background to the reasons for its application.

8.7.2.1 Graphical illustrations and frequency distributions

The principle regarding public scrutiny dictates that there is no sense in conducting research if the researcher does not release the findings or results obtained to the scientific community. Frequency distributions is a user-friendly means of portraying statistical evidence, as graphs are applied to attach visual significance to data obtained and to highlight important findings (Welman & Kruger 2001). In addition to simple frequency distributions, a graphical illustration highlighting the 95% confidence interval notched boxplot and mean diamond is presented. The 95% confidence interval refers to the range around the true mean within which it is expected that 95% of the sample means will fall. The boxplot is an effective way of graphically depicting groups of numerical data and displaying differences between populations without making any assumptions of the underlying statistical distribution. A mean diamond illustration consists of a central horizontal line, which confirms the mean of the sample, as well as a top and bottom of the diamond which represents the confidence intervals.

8.7.2.2 Parametric and non-parametric analysis

While parametric analysis is commonly associated with numerical data, non-parametric analysis is designed mainly to deal with categorical data. Table 8.6 reflects a summary of the outputs achieved in this study through the application of significance testing.

Table 8.6 Outputs of significance testing

Parametric analysis	**Non-parametric analysis**
Mean	Median
Standard deviation (SD)	Interquartile range (IQR)
Standard error (SE)	
Confidence interval (CI)	

The outputs can be defined as follows:

- Mean: A parametric measure of the central tendency of the sample.
- Standard deviation: A measure of the variability of the observations of a sample.

- Standard error: A measure of the variability of a statistic. This is often calculated for the mean, and as such, the standard error of the mean refers to the variability of the mean.
- Median: A non-parametric measure of the central tendency of a sample. Half of the observations from the sample are likely to be above the median, with the other half below it.
- Interquartile range: A non-parametric indication of the distribution of the sample indicating the difference between the lower and upper quartiles.

For the purposes of this study, ordinal data obtained were analysed through a non-parametric investigation, as well as through the mean of the data set. Ratio data were analysed through both a parametric and a non-parametric analysis.

8.7.2.3 Kolgomorov-Smirnov test

The Kolmogorov-Smirnov test was applied to the sum total of the feedback received in order to determine the probability (p-value) that the test results occurred by chance alone. In the instance where the test statistic or the presence of one or more extreme is below the threshold of 5%, a statistically significant relationship is present and the hypothesis is accepted.

The next section will give a summary of the analysis of the results obtained per assessment question.

8.8 STATISTICAL ANALYSIS RESULTS

The previous section discussed the concept of statistical analysis procedures, after which the relevant procedures to be applied to data obtained from the research sample were identified. This section will present the results achieved from the application of the appropriate procedures on the data obtained per individual question as presented in the assessment instrument. A statistical program known as Analyse-It was used for analysis purposes. As discussed earlier in the chapter, a purposive non-probability sampling technique was used for the purposes of this study. In total, feedback was provided by 25 respondents out of an original sample of 40 stakeholders, which equates to a response

rate of 60%. Figure 8.13 reflects a summary of the success rate of the response received as per group of stakeholders who were approached.

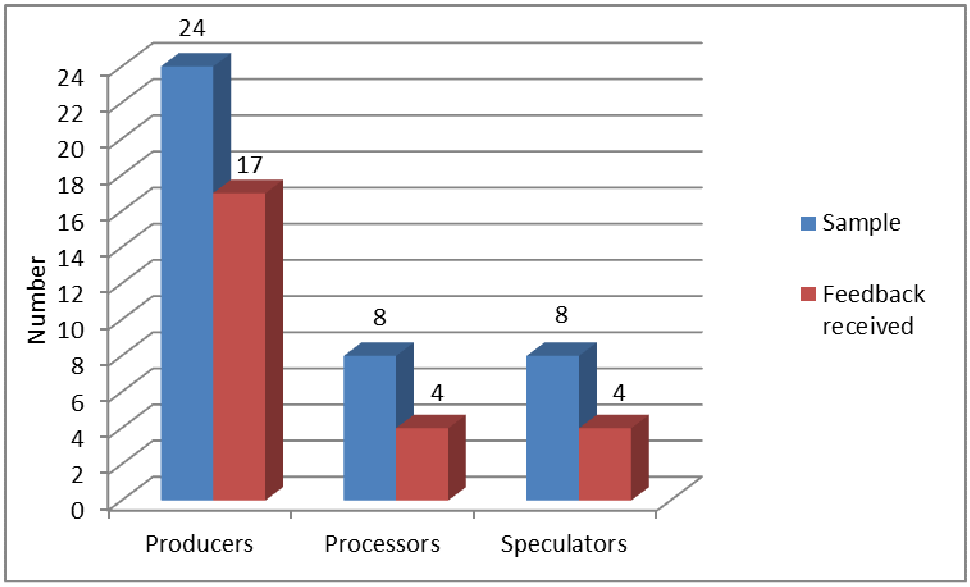

Figure 8.13 Feedback received from sample population

In total, 24 producers were approached of whom 17 responded by means of the assessment instrument. The producers neglecting to complete the questionnaire were contacted, but time-constraints prevented them from returning the questionnaire. Processors approached to complete the assessment instrument amounted to 8 of the total sample consisting of 40 respondents. Of the 8 processors approached, 50% provided feedback while the others indicated that the questions required operational information to be released which was against company policy. Similar to this, only 4 of the 8 speculators approached provided feedback by way of the questionnaire. Repeated requests did not result in any further responses.

The ensuing sections will analyse the results obtained per individual assessment question and will also indicate the statistical analysis procedures applied.

8.8.1 Level of financial exposure to corn price fluctuations

In order to determine the level of financial exposure faced by market participants due to corn price variability, respondents were asked to rate the level of financial exposure to which they were subjected as a result of movements in the price of corn. The assessment

instrument included a Likert-type rating scale from which respondents were required to exercise their choice:

- 1 = Exceptionally low
- 2 = Low
- 3 = Average
- 4 = High
- 5 = Exceptionally high

As this type of rating scale represents ordinal data, the following statistical measures were applied:

- graphical presentation and frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.14 provides a graphical illustration of the response received, while Figure 8.15 presents the feedback through a frequency distribution. From the figure illustrations, it is evident that all three groups of stakeholders who were approached (producers, processors and speculators) as part of the survey have fundamental and essential exposure to corn price variability and movement. In particular, speculators indicated an overwhelmingly high exposure to changes in the price of corn as their financial success is solely dependent on movements in the price of corn. Figure 8.14 confirms, through the boxplot method, that the majority of producers rate their level of financial exposure to corn price fluctuations at a level of between 4 and 5, with the minimum outlier at 3 and the maximum outlier at 5. The majority of processors provided a rating of between 3.5 and 4.5, with the minimum outlier at 3 and the maximum outlier at 5, while all speculators confirmed a financial exposure to corn price fluctuations at a level of 5. The mean diamond confirms the respective mean response obtained from the alternative stakeholders through the horizontal line in the middle of the diamond graph, with the top and bottom of the graph representing the respective 95% confidence intervals.

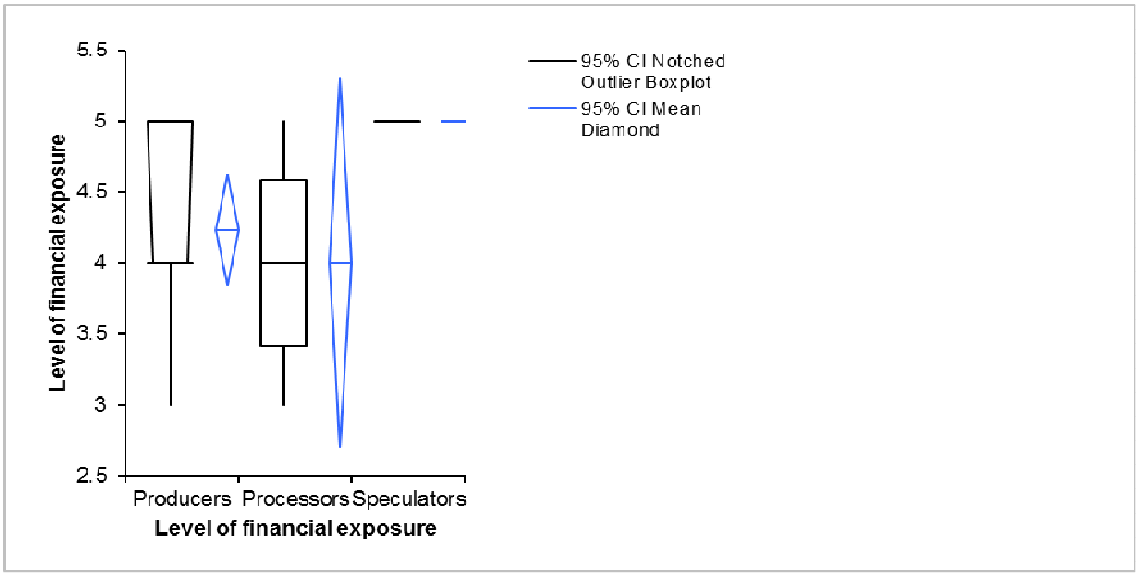

Figure 8.14 Graphical illustration of financial exposure of market participants to corn price fluctuations

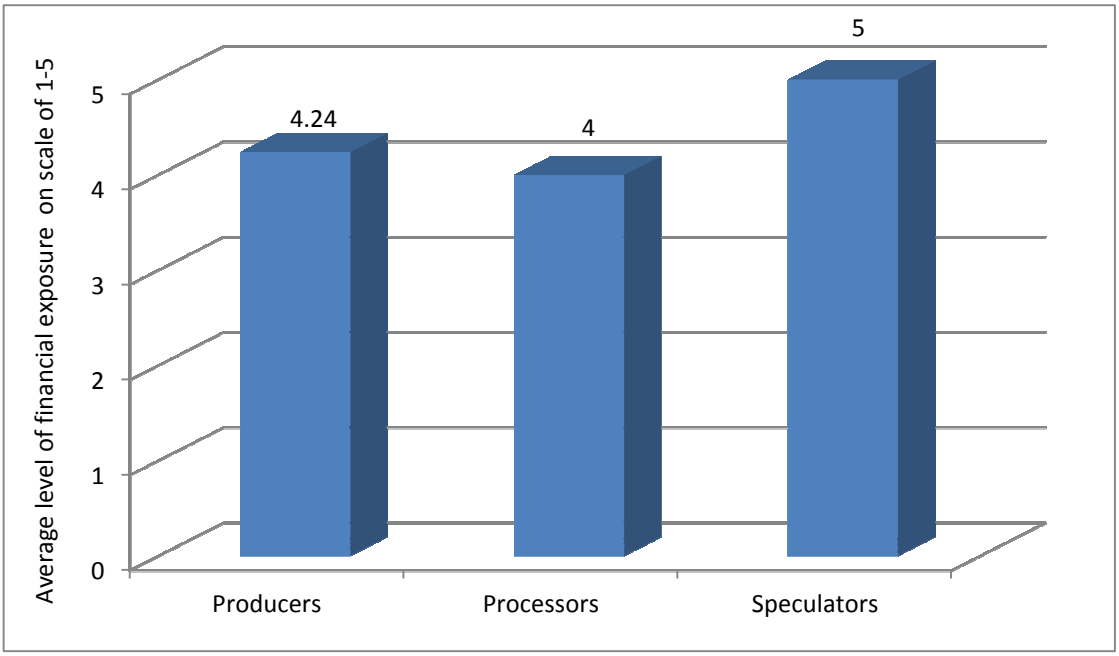

Figure 8.15 Frequency distribution of financial exposure of market participants to corn price fluctuations

Table 8.7 highlights the results from the non-parametric analysis. The mean for the alternative stakeholders is presented in Table 8.8.

Table 8.7 Non-parametric analysis of exposure to corn price fluctuations

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	3	4.0	4.0	4.0–5.0	5.0	5	1.0
Processors	4	3	3.4	4.0	-	4.6	5	1.2
Speculators	4	5	5.0	5.0	-	5.0	5	0

Table 8.8 Mean response on exposure to corn price fluctuations

Stakeholder	Mean
Producers	4.2
Processors	4.0
Speculators	5.0

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.0001, and therefore the result is indeed statistically significant.

8.8.2 Impact of corn price on business profitability

The price of corn can have either a direct or indirect impact on the profitability of a business. In the instance where business profitability can be traced back to the price of corn, it is said to have a direct impact, while the impact is indirect when the corn price affects part of a sector or industry which, as a result, has an influence on business profitability.

In order to determine whether corn prices affect stakeholders directly or indirectly, respondents were asked by means of a list question to rate the impact of corn prices on their individual businesses.

As this represents ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.16 reflects a summary of the results obtained.

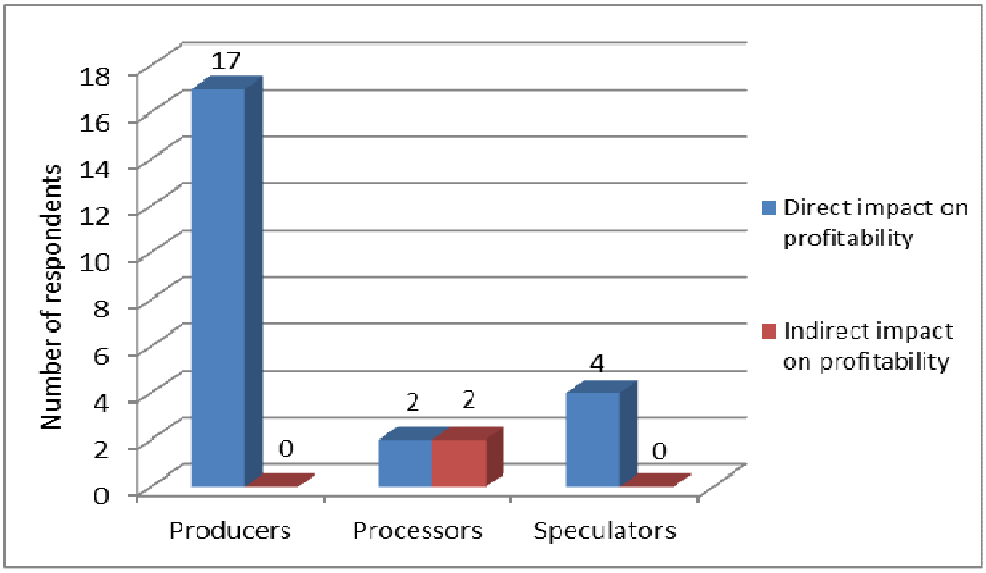

Figure 8.16 Effect of corn price on business profitability

From the graph, it is evident that producer- and speculator profitability were directly influenced by corn prices, while processors were undecided on the answer. This can be attributed to consumers actually absorbing the majority of corn price increases (Thomas 2007). The higher corn price generally tends to have a negative impact on demand, which in turn affects processor profitability. Table 8.9 highlights the results from the non-parametric analysis. The mean for the alternative stakeholders is presented in Table 8.10.

Table 8.9 Non-parametric analysis of effect of corn price on business profitability

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	1.0	1.0–1.0	1.0	1	0.0
Processors	4	1	1.0	1.5	-	2.0	2	1.0
Speculators	4	1	1.0	1.0	-	1.0	1	0.0

Table 8.10 Mean response on effect of corn price on business profitability

Stakeholder	**Mean**
Producers	1.0
Processors	1.5
Speculators	1.0

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.0001 and therefore the result is indeed statistically significant.

8.8.3 Predominant trend in corn price volatility

Respondents were asked to rate the general trend in corn price volatility as experienced by their respective businesses. The assessment instrument included a Likert-type rating scale from which respondents were required to exercise their choice:

- 1 = Decreasing
- 2 = Stable
- 3 = Increasing

As this represents ordinal data, the following statistical measures were applied:

- graphical presentation and frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.17 provides a graphical illustration of the response received, while Figure 8.18 presents the feedback by means of a frequency distribution. The boxplot method in Figure 8.17 shows that producers consider the trend in corn price volatility to be either stable or increasing, with the minimum outlier at 2 and the maximum outlier at 3. The majority of processors and speculators provided a rating of between 2.4 and 3, with the minimum outlier at 1 and the maximum outlier at 3. The mean diamond confirms the mean response obtained from producers at a level of 2.6, with the top and bottom of the graph representing the respective 95% confidence intervals. The mean of the response obtained from processors and speculators, as shown in the mean diamond illustration, is 2.8.

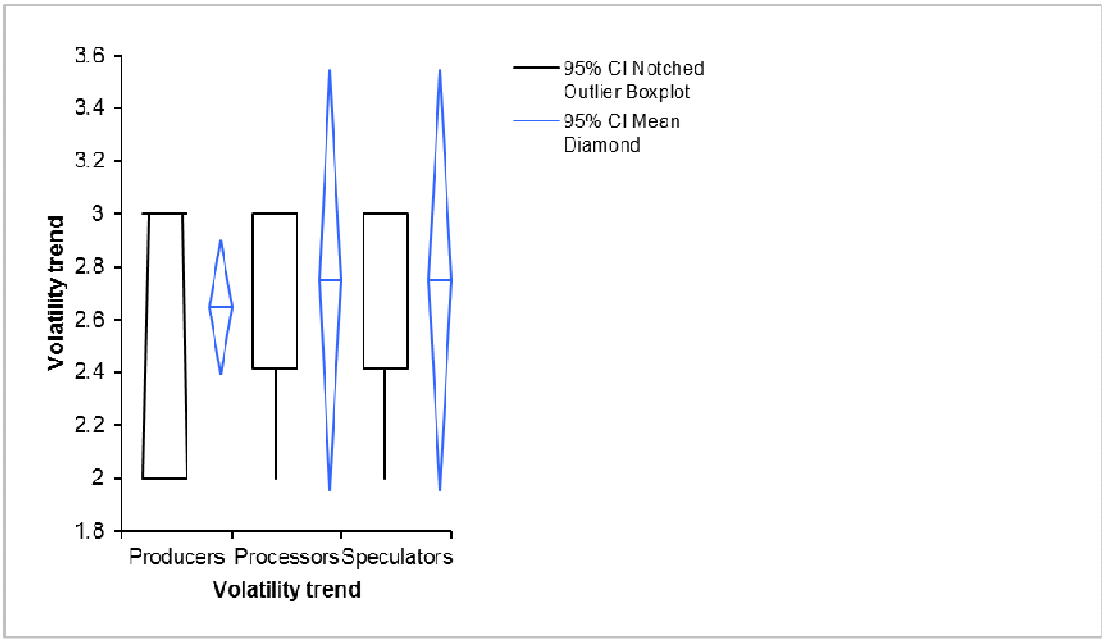

Figure 8.17 Graphical illustration of trend in corn price volatility as experienced by stakeholders

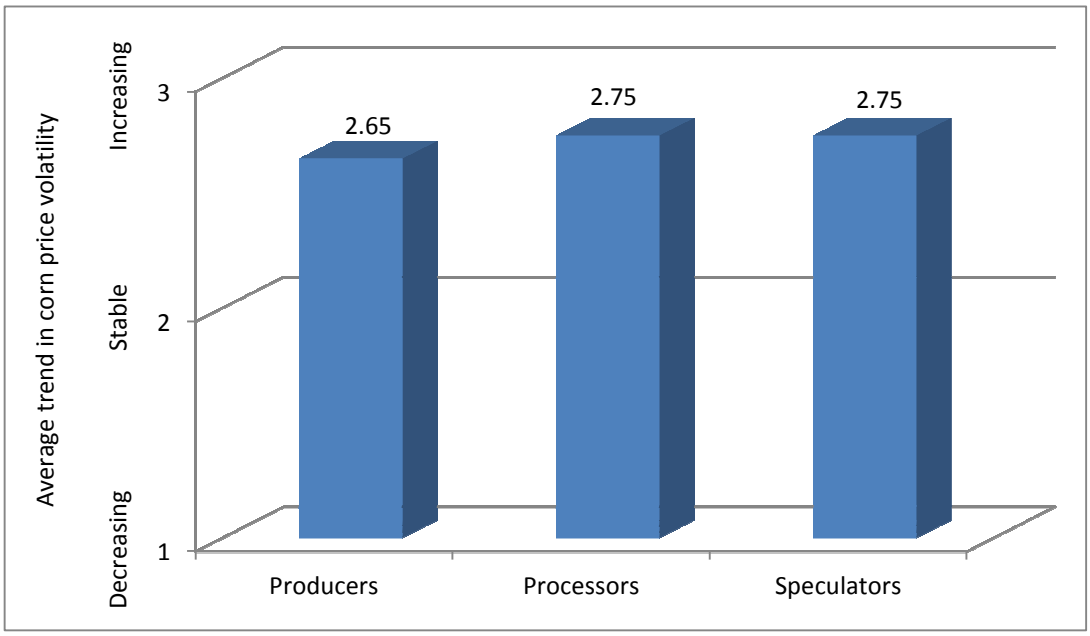

Figure 8.18 Frequency distribution of trend in corn price volatility as experienced by stakeholders

From these graphs, it is evident that all three groups of stakeholders who were approached (producers, processors and speculators) as part of the survey experienced corn price volatility as either stable or increasing with no stakeholders indicating a decreasing volatility trend.

Table 8.11 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is presented in table 8.12.

Table 8.11 Non-parametric analysis of trend in corn price volatility

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	2	2.0	3.0	2.0–3.0	3.0	3	1.0
Processors	4	2	2.4	3.0	-	3.0	3	0.6
Speculators	4	2	2.4	3.0	-	3.0	3	0.6

Table 8.12 Mean response on trend in corn price volatility

Stakeholder	**Mean**
Producers	2.6
Processors	2.8
Speculators	2.8

The p-value obtained by means of the Kolmogorov-Smirnov test is smaller than the 5% threshold and therefore the result is indeed statistically significant.

8.8.4 Impact of price volatility on hedging decisions

Stakeholders were asked by means of a list question to indicate whether an increase in price volatility complicated their trading decisions. This was an important consideration as stakeholders indicated in an earlier question that price volatility was in fact increasing. A conclusion that higher volatility levels do in fact complicate trading decisions of stakeholders will serve as extra motivation for the acceptance of the proposed price risk management methodology.

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.19 reflects a summary of the responses received through a frequency distribution. As depicted by the illustration, all respondents indicated that an increase in corn price

volatility indeed complicates the trading decisions of their respective businesses. Table 8.13 reflects a summary of the results from the non-parametric analysis, while calculations of the mean for the alternative stakeholders are shown in Table 8.14.

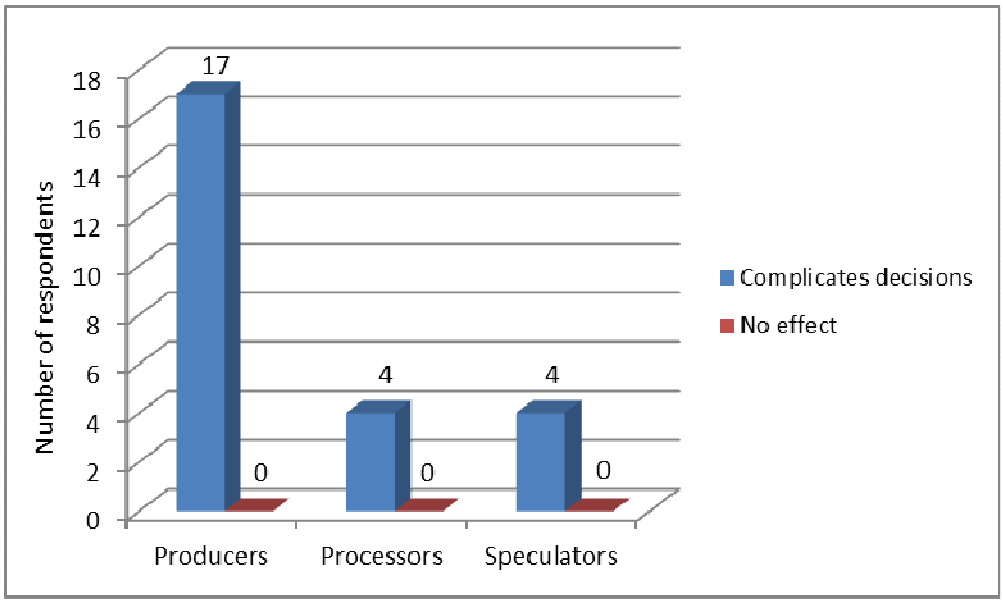

Figure 8.19 Frequency distribution of the effect of increased price volatility on trading decisions

Table 8.13 Non-parametric analysis of impact of corn price volatility on trading decisions

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	1	1.0	1.0	1.0–1.0	1.0	1	0.0
Processors	4	1	1.0	1.5	-	2.0	2	1.0
Speculators	4	1	1.0	1.0	-	1.0	1	0.0

Table 8.14 Mean response on effect of corn price volatility on trading decisions

Stakeholder	Mean
Producers	1.0
Processors	1.0
Speculators	1.0

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.0001 and therefore the result is indeed statistically significant.

8.8.5 Price forecasting as counter against price volatility

In order to determine whether market participants attempt to anticipate future corn price movements to counter price volatility, a list question required from respondents to indicate whether they make use of price forecasting in their trading strategies. This was important; as a literature study conducted in Chapter 5 rejected the notion of price forecasting.

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.20 graphically presents the results by means of a frequency distribution.

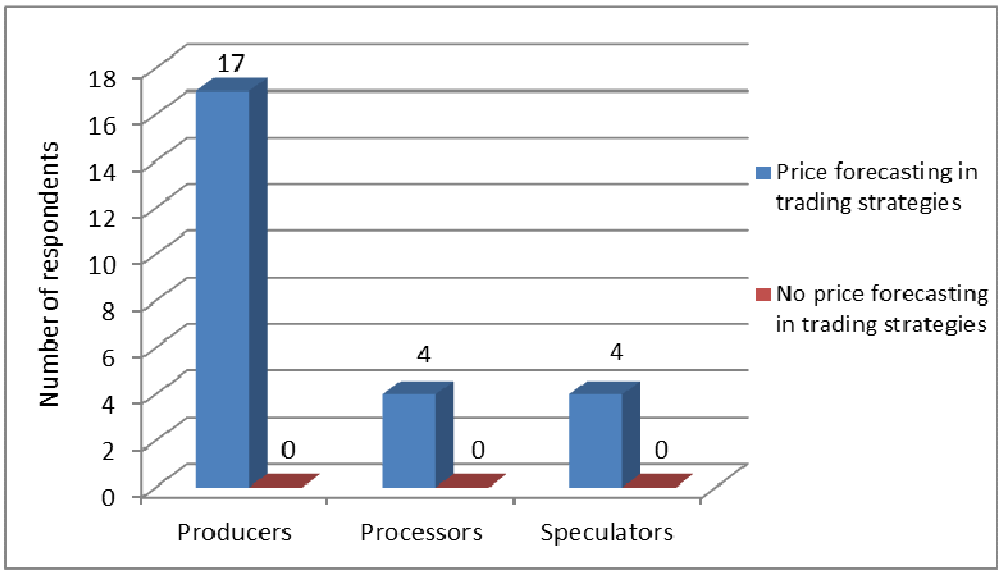

Figure 8.20 Frequency distribution on the presence of price forecasting in trading strategies

As concluded from the illustration, all of the respondents indicated that the trading strategies from their respective businesses consisted in part of a price-forecasting foundation.

Table 8.15 reflects a summary of the results from the non-parametric analysis, while the result for the mean for the alternative stakeholders is summarised in Table 8.16.

Table 8.15 Non-parametric analysis of the presence of price forecasting in trading strategies

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	1	1.0	1.0	1.0–1.0	1.0	1	0.0
Processors	4	1	1.0	1.0	-	1.0	1	1.0
Speculators	4	1	1.0	1.0	-	1.0	1	0.0

Table 8.16 Mean response on the presence of price forecasting in trading strategies

Stakeholder	Mean
Producers	1.0
Processors	1.0
Speculators	1.0

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.0001 and therefore the result is indeed statistically significant.

8.8.6 Market analysis applied as means of price forecasting

In order to determine the particular form of analysis applied by market stakeholders in their anticipation of future price movements, respondents were asked to indicate whether they predominantly make use of technical analysis, fundamental analysis or trend analysis in their forecasting of corn futures prices. A list question was presented to the population sample from which they were required to exercise their choice:

- 1 = Technical analysis
- 2 = Fundamental analysis
- 3 = Trend analysis

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.21 provides a graphical illustration of the response received, while Figure 8.22 presents the feedback by means of a frequency distribution. Figure 8.21 confirms, through

the boxplot method, that the majority of producers tend to favour fundamental analysis as a means of price forecasting, with the minimum outlier at 1.7 and the maximum outlier at 2. The response from the majority of processors correlated with that of producers, although a minimum outlier of 1 indicates that technical analysis is the main method of price forecasting for the minority of processors. Speculators tend to be divided between technical and fundamental analysis, with a minimum outlier of 1 and a maximum outlier of 2. The mean diamond confirms the respective mean response obtained from the alternative stakeholders through the horizontal line in the middle of the diamond graph, with the top and bottom of the graph representing the respective 95% confidence intervals.

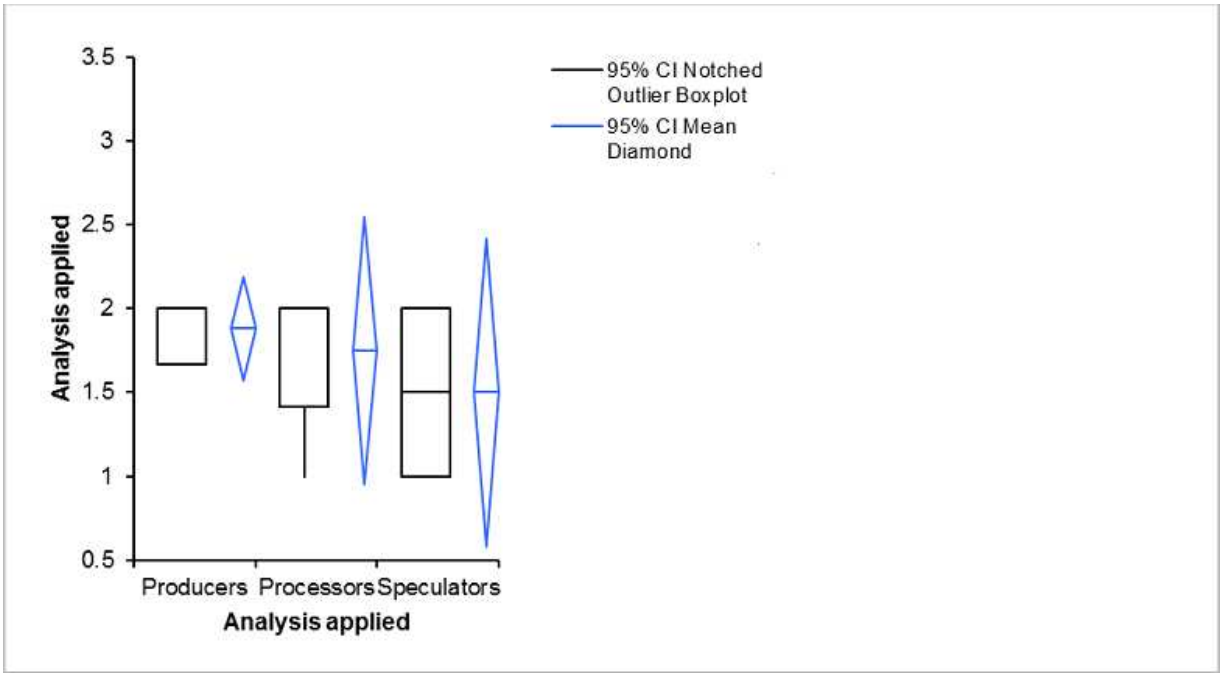

Figure 8.21 Graphical illustration of analysis applied in forecasting of corn futures prices

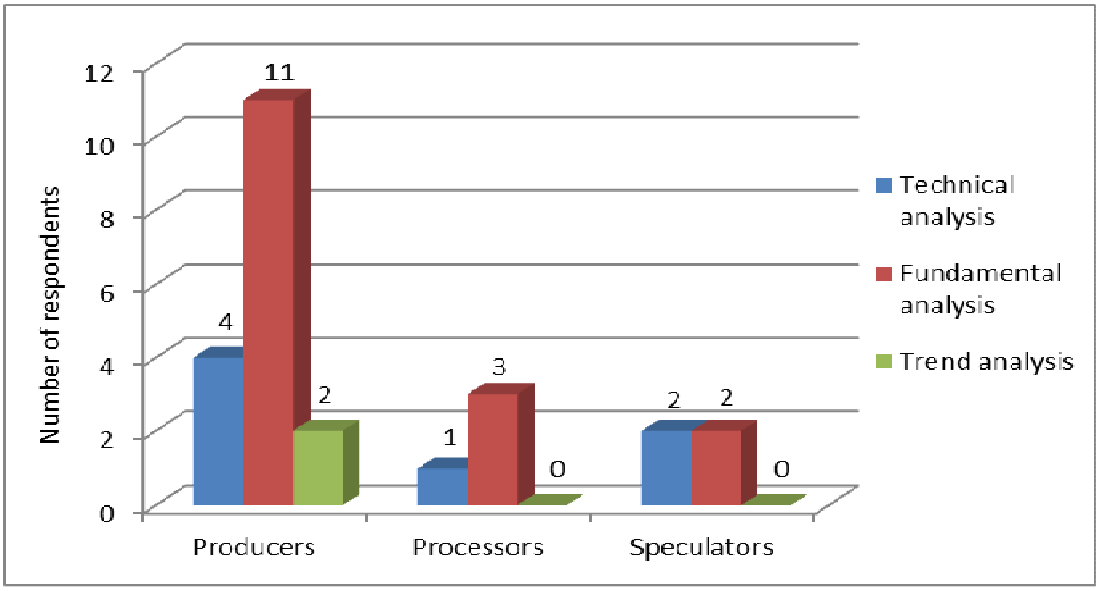

Figure 8.22 Frequency distribution on analysis applied in forecasting of corn futures prices

From these graphs, it is evident that producers and processors prefer fundamental analysis, while speculators are divided between fundamental analysis and technical analysis as means of price forecasting. Surprisingly, few stakeholders made use of trend analysis.

Table 8.17 highlights the results from the non-parametric analysis, while Table 8.18 reflects a summary of the mean response received from the respondents.

Table 8.17 Non-parametric analysis of market analysis as means of price forecasting

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.7	2.0	2.0–2.0	2.0	3	0.3
Processors	4	1	1.4	2.0	-	2.0	2	0.6
Speculators	4	1	1.0	1.5	-	2.0	2	1.0

Table 8.18 Mean response on market analysis as means of price forecasting

Stakeholder	**Mean**
Producers	3.0
Processors	2.3
Speculators	3.0

The p-value obtained by means of the Kolmogorov-Smirnov test is < 5% and therefore the result is indeed statistically significant.

8.8.7 Price-forecasting success

The sample population was asked to rate the general level of price-forecasting success achieved by their businesses. This was done by means of a Likert-type rating scale with the objective of determining the effectiveness of price forecasting in trading strategies. The assessment question included the following options from which respondents were required to exercise their choice:

- 1 = Exceptionally low
- 2 = Low
- 3 = Average
- 4 = High
- 5 = Exceptionally high

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.23 provides a graphical illustration of the response received, while Figure 8.24 reflects a summary of the feedback by means of a frequency distribution. From these illustrations, it is evident that neither producers, processors nor speculators achieved substantial success through price forecasting. The boxplot method, as presented in Figure 8.23, confirms that the majority of producers rate their level of price-forecasting success as average, with the minimum outlier at 2 and the maximum outlier at 4. The majority of processors rate their price-forecasting success as below average at levels of between 2 and 2.5, with the minimum outlier at 2 and the maximum outlier at 3, while all speculators confirmed an average success level regarding the forecasting of future price movements. The mean diamond confirms the mean response obtained from producers at an average level of 3, with the top and bottom of the graph representing the respective 95% confidence intervals. The mean of the response obtained from processors is 2.3, while the mean response of speculators is similar to that of producers at a level of 3.

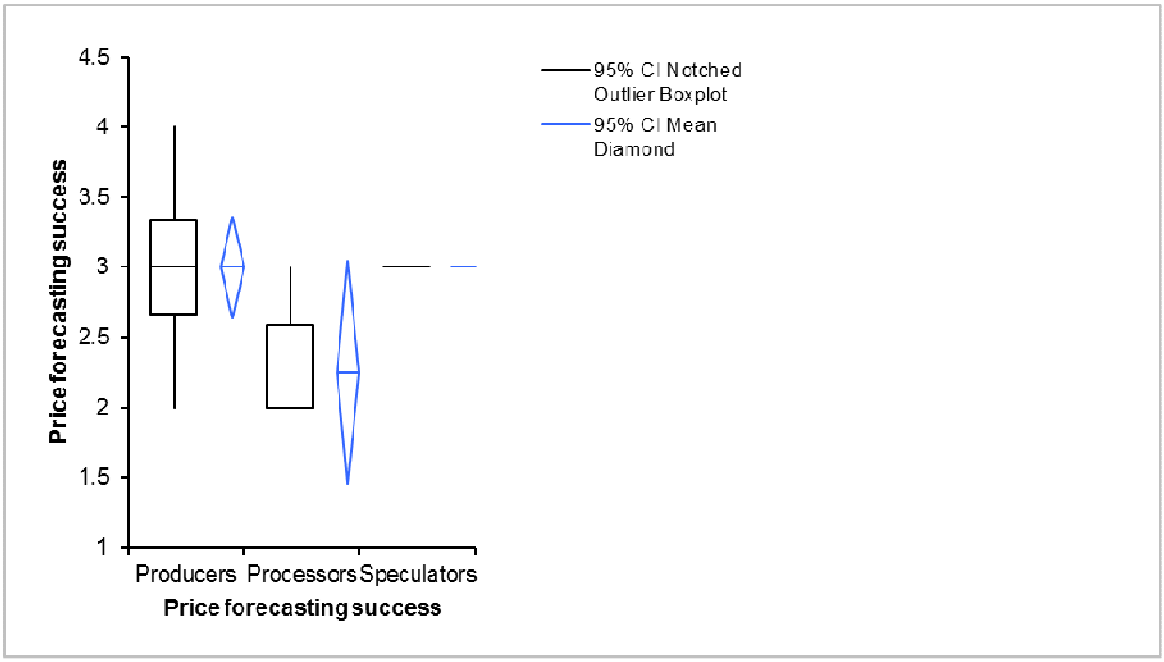

Figure 8.23 Graphical illustration of price-forecasting success of market stakeholders

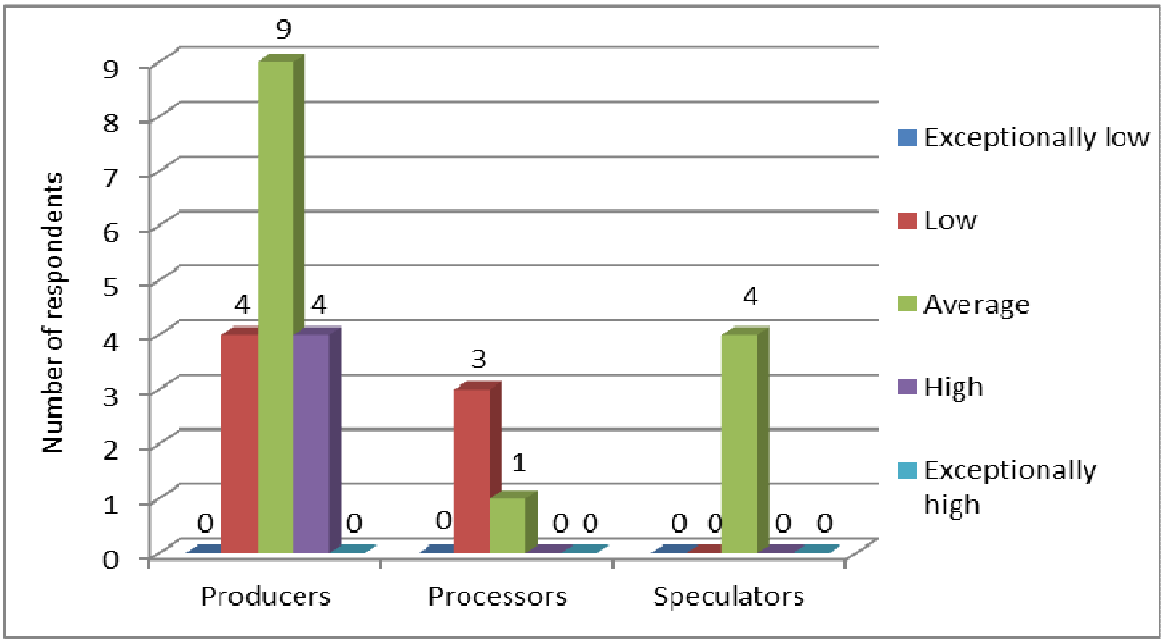

Figure 8.24 Frequency distribution on price-forecasting success of market stakeholders

Table 8.19 highlights the results from the non-parametric analysis, while Table 8.20 reflects a summary of the mean response.

Table 8.19 Non-parametric analysis of price-forecasting success of stakeholders

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	2	2.7	3.0	3.0–3.0	3.3	4	0.7
Processors	4	2	2.0	2.0	-	2.6	3	0.6
Speculators	4	3	3.0	3.0	-	3.0	3	0.0

Table 8.20 Mean response on price-forecasting success of stakeholders

Stakeholder	Mean
Producers	3.0
Processors	2.3
Speculators	3.0

The p-value obtained by means of the Kolmogorov-Smirnov test is lower than 3% and therefore the result is indeed statistically significant.

8.8.8 Level of success achieved through price forecasting

In order to determine the effectiveness and level of success by which market participants are able to forecast the future price movements of corn futures contracts effectively, the sample population was asked to estimate the level of price-forecasting success achieved by their businesses by way of a ratio question.

The question included the following alternatives from which respondents were required to exercise their choice:

- 0 = 0% success
- 1 = 10% success
- 2 = 20% success
- 3 = 30% success
- 4 = 40% success
- 5 = 50% success
- 6 = 60% success
- 7 = 70% success
- 8 = 80% success

- 9 = 90% success
- 10 = 100% success

As this question represented ratio data, the following statistical measures were applied:

- frequency distribution;
- parametric and non-parametric analysis; and
- the Kolgomorov-Smirnov test.

Figure 8.25 provides a graphical illustration of the response received, while Figure 8.26 reflects a summary of the feedback by means of a frequency distribution. Figure 8.25 indicates, by means of the boxplot method, that the majority of producers have a price-forecasting success ratio of between 50% and 60%, with the minimum outlier at 30% and the maximum outlier at 70%. The response from the majority of processors is very much similar to that of producers, although the minimum outlier of 40% is higher than that of producers. Speculators indicated a success ratio of exclusively between 50% and 60%. The mean diamond confirms that the respective mean response obtained from the alternative stakeholders are very much consistent with each other, even though the mean diamond confirms a higher top and lower bottom 95% confidence interval for processors.

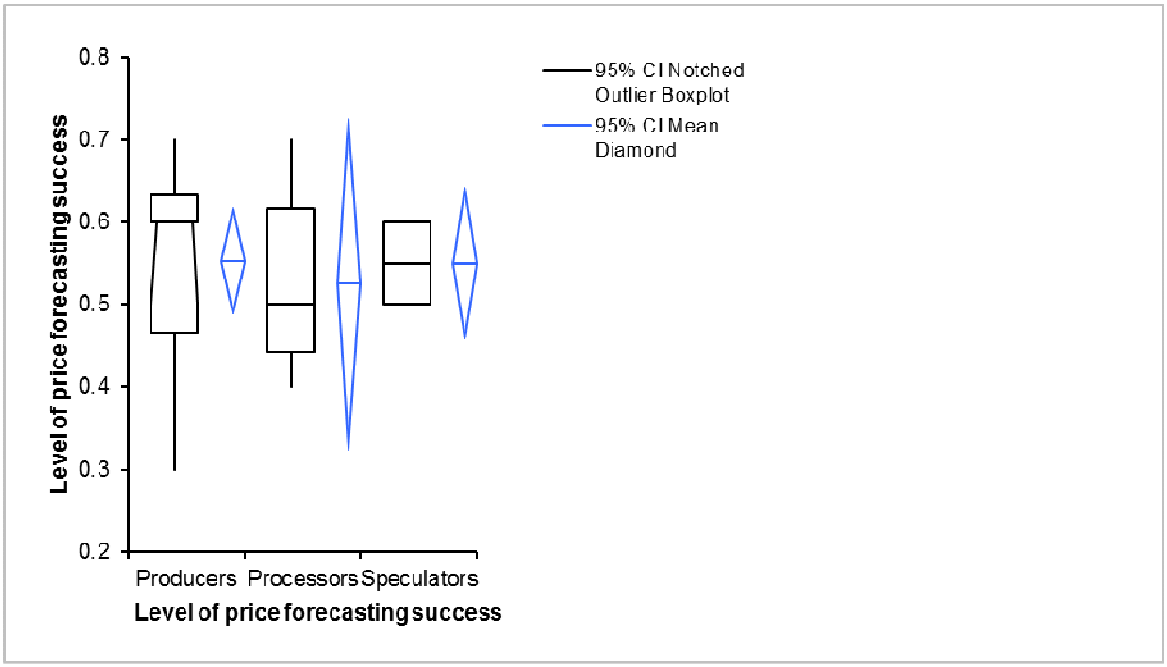

Figure 8.25 Graphical illustration of level of success achieved through price-forecasting

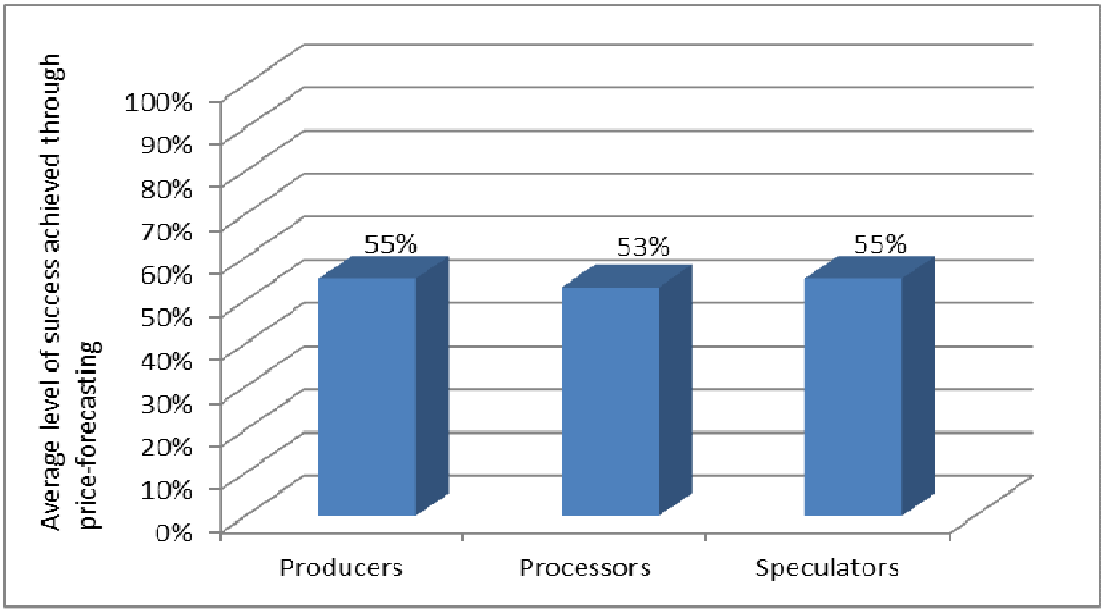

Figure 8.26 Frequency distribution on level of success achieved through price-forecasting

From these graphs, it is evident that producers, processors and speculators (on average) achieved only moderate success in price forecasting. This confirms the results from the earlier literature study on the subject.

Table 8.21 highlights the results from the parametric analysis while Table 8.22 reflects a summary of the results from the non-parametric analysis.

Table 8.21 Parametric analysis of level of success achieved by means of price-forecasting

Parametric analysis	**N**	**Mean**	**95% CI**	**SE**	**SD**
Producers	17	55.3%	49.0%–61.6%	2.98%	12.31%
Processors	4	52.5%	32.5%–72.5%	6.29%	12.58%
Speculators	4	55.0%	45.8%–64.2%	2.89%	5.77%

Table 8.22 Non-parametric analysis of level of success achieved by means of price-forecasting

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	30%	46.7%	60%	50%–60%	63.3%	70%	16.7%
Processors	4	40%	44.2%	50%	-	61.7%	70%	17.5%
Speculators	4	50%	50.0%	55%	-	60.0%	60%	10.0%

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.012 and since this value is lower than the threshold of 5%, the result is indeed statistically significant.

8.8.9 Consistency of accurate price forecasts

The sample population was asked by means of a list question to judge the consistency with which they are able to make accurate price forecasts. It was important to determine this as certain strategies might have been able to achieve exaggerated returns, but not on a consistent basis.

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.27 graphically presents the results by means of a frequency distribution.

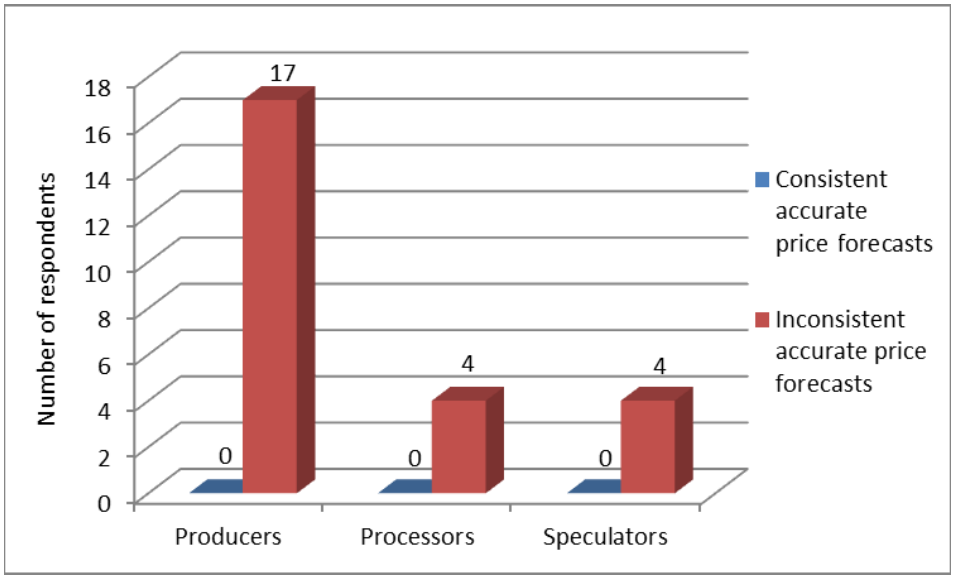

Figure 8.27 Frequency distribution on consistency of accurate price forecasts

As is clear from the illustration, none of the respondents indicated that they were able to achieve price-forecasting success on a consistent basis over a period of time.

Table 8.23 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is summarised in Table 8.24.

Table 8.23 Non-parametric analysis of consistency of accurate price forecasts

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	2	2.0	2.0	2.0–2.0	2.0	2	0.0
Processors	4	2	2.0	2.0	-	2.0	2	0.0
Speculators	4	2	2.0	2.0	-	2.0	2	0.0

Table 8.24 Mean response on consistency of accurate price forecasts

Stakeholder	Mean
Producers	2.0
Processors	2.0
Speculators	2.0

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.0001 and therefore the result is indeed statistically significant.

8.8.10 Type of trading strategy implemented

In order to determine the willingness of market participants to adjust their trading strategies, a list question was presented to the sample population through which they were asked to indicate whether similar trading strategies are implemented by their respective businesses on an annual basis, or whether they annually adjust the underlying methodology by which corn futures prices are traded. This was an important consideration, since the proposed methodology allows the trader to implement exactly the same strategy throughout notwithstanding the existence of a bullish, bearish or neutral market.

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.28 provides a graphical illustration of the results obtained by means of a frequency distribution.

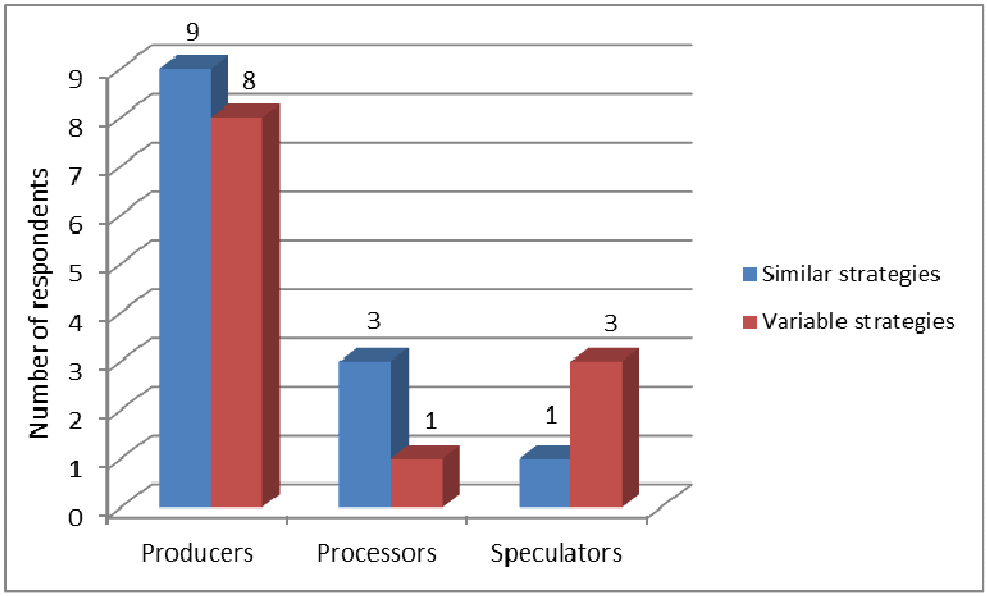

Figure 8.28 Frequency distribution on consistency of trading strategies applied by stakeholders

As illustrated above, producers and processors tend to implement the same strategy continuously, while speculators are more inclined to adjust the strategy they apply on the underlying corn futures price.

Table 8.25 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is summarised in Table 8.26.

Table 8.25 Non-parametric analysis of consistency of trading strategies applied by stakeholders

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	1.0	1.0–2.0	2.0	2	1.0
Processors	4	1	1.0	1.0	-	1.6	2	0.6
Speculators	4	2	2.0	2.0	-	2.0	2	0.0

Table 8.26 Mean response on consistency of trading strategies applied by stakeholders

Stakeholder	**Mean**
Producers	1.5
Processors	1.3
Speculators	2.0

The p-value obtained by means of the Kolmogorov-Smirnov test is within the 5% threshold and therefore the result is indeed statistically significant.

8.8.11 Impact of price trends on strategy applied

Since the proposed price risk management methodology allows the user to implement the same trading strategy notwithstanding the current market trend, the sample population was asked by means of a list question to indicate whether they allow the underlying market trend to determine the strategy implemented.

As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.29 reflects a summary of the response received by way of a frequency distribution.

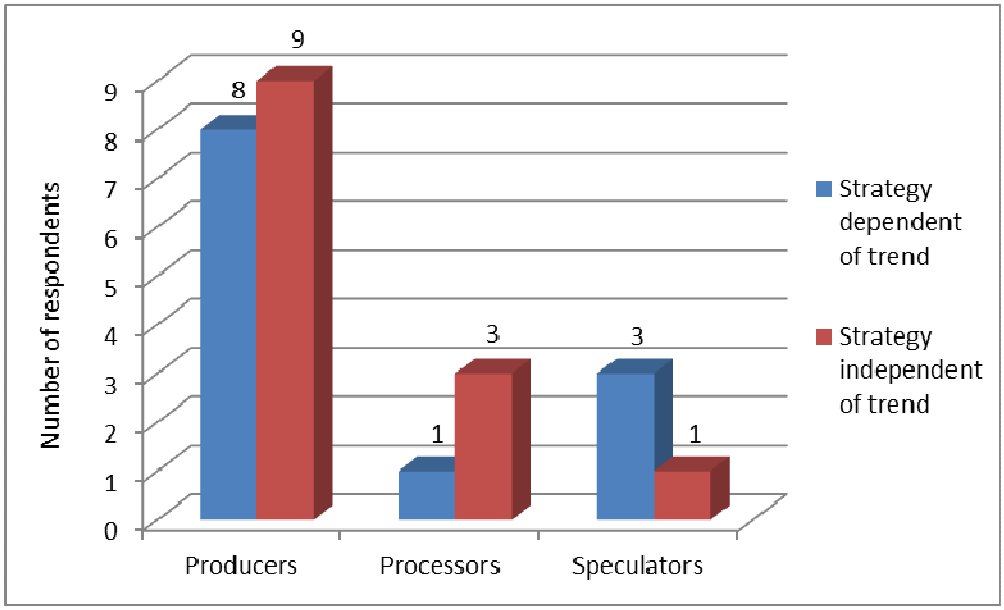

Figure 8.29 Frequency distribution on effect of price trend on strategy implemented

The graphical presentation confirms that both producers and processors are reluctant to alter trading strategies based upon the market price trend. Speculators appear to be more willing to react on changing price trends in the application of their strategies.

Table 8.27 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is summarised in Table 8.28.

Table 8.27 Non-parametric analysis of effect of price trend on strategy implemented

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	2.0	1.0–2.0	2.0	2	1.0
Processors	4	1	1.4	2.0	-	2.0	2	0.6
Speculators	4	1	1.0	1.0		1.0	1	0.0

Table 8.28 Mean response on effect of price trend on strategy implemented

Stakeholder	**Mean**
Producers	1.5
Processors	1.8
Speculators	1.0

The p-value obtained by means of the Kolmogorov-Smirnov test is within the 5% threshold and therefore the result is indeed statistically significant.

8.8.12 Percentage of corn crop/usage hedged before contract maturity

Producers and processors in the sample population were confronted with the ratio question of which percentage of the expected corn crop (producers) or corn usage (processors) they historically hedge upfront by means of forward (futures and options) contracts. While the proposed price risk management methodology allows for the user to hedge the total volume of grain, it is questionable whether market participants are prepared to hedge their full quantity of corn production/usage upfront.

The assessment question included a scale from which respondents were required to exercise their choice:

- 0 = 0% of expected volume produced/processed
- 1 = 10% of expected volume produced/processed
- 2 = 20% of expected volume produced/processed
- 3 = 30% of expected volume produced/processed

- 4 = 40% of expected volume produced/processed
- 5 = 50% of expected volume produced/processed
- 6 = 60% of expected volume produced/processed
- 7 = 70% of expected volume produced/processed
- 8 = 80% of expected volume produced/processed
- 9 = 90% of expected volume produced/processed
- 10 = 100% of expected volume produced/processed

As this question represented ratio data, the following statistical measures were applied:

- frequency distribution;
- parametric and non-parametric analysis; and
- the Kolgomorov-Smirnov test.

Figure 8.30 provides a graphical illustration of the response received, while Figure 8.31 reflects a summary of the feedback by means of a frequency distribution. Figure 8.30 confirms, through the boxplot method, that producers mostly hedge between 30% and 50% of their expected crop before contract maturity, although the minimum outlier is only 10% and the maximum outlier is 70%. The majority of processors provided a hedging ratio of no greater than 20%. The mean diamond confirms the respective mean response obtained from the alternative stakeholders through the horizontal line in the middle of the diamond graph. The mean of the response obtained from producers is 44.1% and that of processors is 10%, with the top and bottom of the graph representing the respective 95% confidence intervals.

From these illustrations it is obvious that processors are less willing to take up forward-type positions in comparison to producers. In addition to this, producers, on average, hedge less than half of their expected crop through either futures or options contracts.

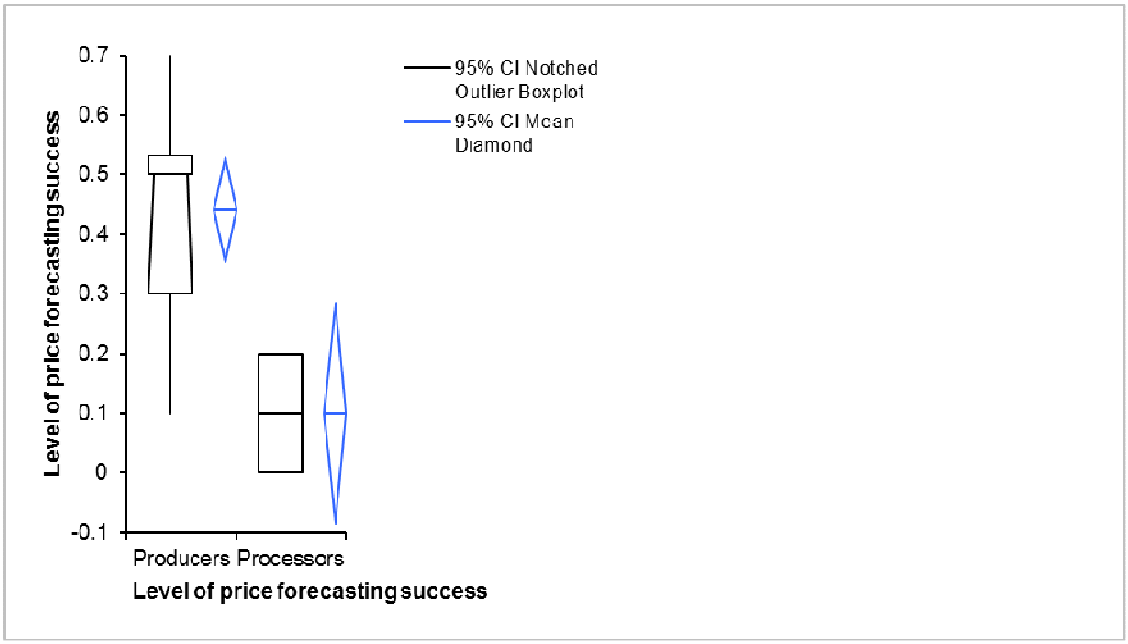

Figure 8.30 Graphical presentation of percentage of corn production/usage hedged upfront

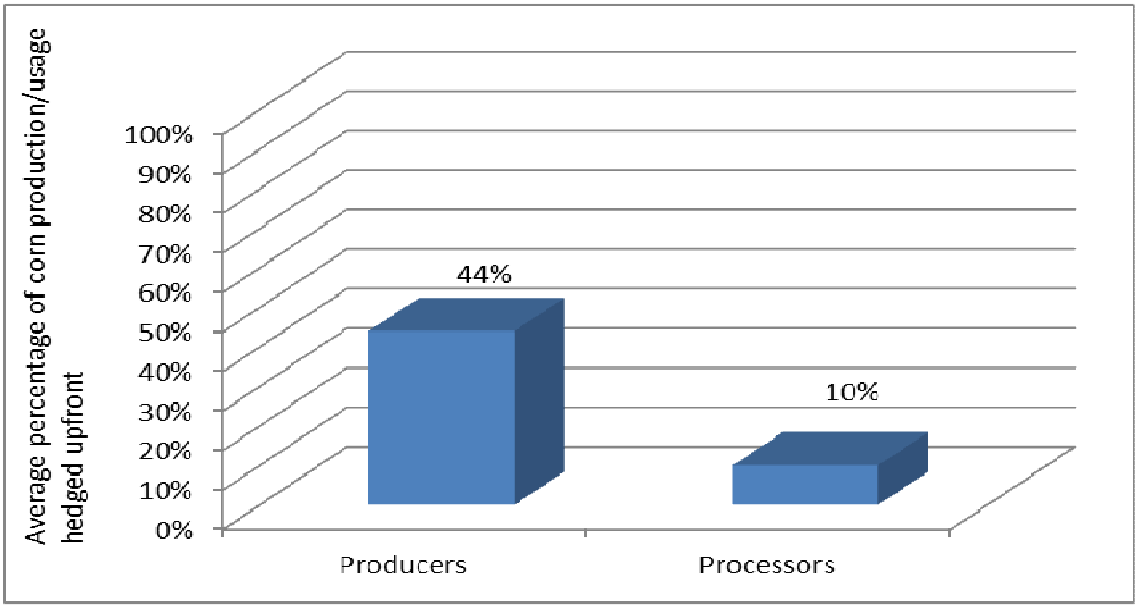

Figure 8.31 Frequency distribution on percentage of corn production/usage hedged upfront

Table 8.29 highlights the results from the parametric analysis while Table 8.30 reflects a summary of the results from the non-parametric analysis.

Table 8.29 Parametric analysis of percentage of corn production/usage hedged upfront

Parametric analysis	N	Mean	95% CI	SE	SD
Producers	17	44.1%	35.4%–52.8%	4.12%	16.98%
Processors	4	10.0%	-8.4%–28.4%	5.77%	11.55%

Table 8.30 Non-parametric analysis of percentage of corn production/usage hedged upfront

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	10%	30.0%	50.0%	30%–50%	53.3%	70%	23.3%
Processors	4	0%	0.0%	10.1%	-	20.0%	20%	20.0%

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.024 and therefore the result is indeed statistically significant.

8.8.13 Importance of force majeure characteristic in trading strategy

A force majeure allows the holder thereof the right to exercise the choice on whether or not to actually engage in the pricing of the underlying commodity as intended by the initial pricing strategy. It is of particular value and most often applied when a producer cannot deliver the contracted tonnages or when the processor does not need the total volume of commodity originally contracted. A major drawback of the force majeure, which hampers its popularity, is the cost associated with its implementation.

Since the proposed price risk management methodology consists of a force majeure, its importance to market stakeholders needs to be determined. This was done by using a Likert-type rating scale with the objective of determining the necessity of a trading methodology incorporating a force majeure. The assessment question included a scale from which respondents were required to exercise their choice on the importance of a force majeure:

- 1 = Unimportant
- 2 = Low importance
- 3 = Average
- 4 = Important

- 5 = Very important

As this question represented ordinal data, the following statistical measures were applied:

- graphical illustration and frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.32 provides a graphical illustration of the response received, while Figure 8.33 presents the findings by means of a frequency distribution. The boxplot graph in Figure 8.32 indicates that the majority of producers rate a force majeure characteristic as being of low to average importance, with a minimum outlier of 2 and a maximum outlier of 4. The response from the majority of processors is consistent to that of producers, although the maximum outlier of 3 is lower than that of producers. The horizontal line in the mean diamond graph indicates a mean response from producers of 2.8, while the mean response from processors is slightly lower at 2.3. Consistent with the lower mean response from processors, the top and bottom of the 95% confidence interval are lower as well.

From these graphs, it is evident that producers, on average, tend to rate a force majeure characteristic as more important than processors. This can be attributed to the high degree of production risk experienced by producers.

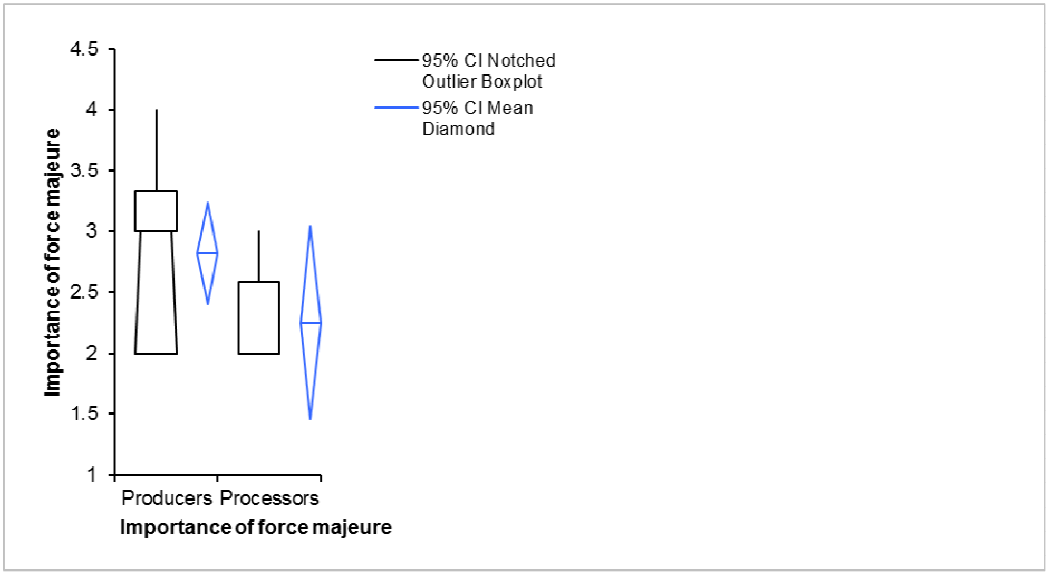

Figure 8.32 Graphical illustration of importance of force majeure

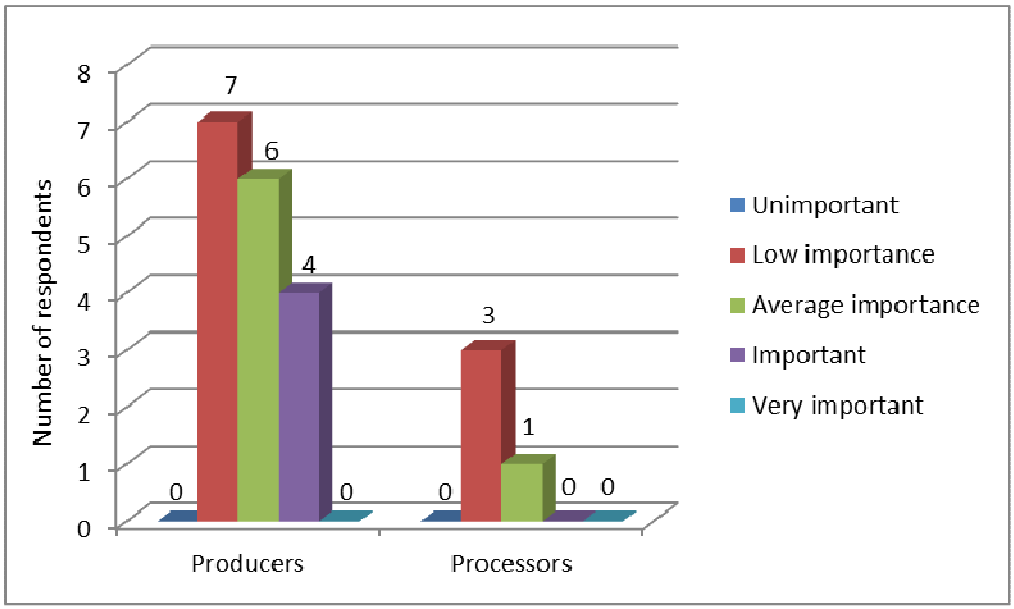

Figure 8.33 Frequency distribution on importance of force majeure

Table 8.31 highlights the results from the non-parametric analysis while Table 8.32 reflects a summary of the mean from the respondent feedback.

Table 8.31 Non-parametric analysis of importance of force majeure characteristic

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	2	2.0	3.0	2.0–3.0	3.3	4	1.3
Processors	4	2	2.0	2.0	-	2.6	3	0.6

Table 8.32 Mean response on importance of force majeure characteristic

Stakeholder	**Mean**
Producers	2.8
Processors	2.3

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.004 and therefore the result is indeed statistically significant.

8.8.14 Options contracts incorporated in trading strategy

Options contracts are important in the proposed price risk management methodology for a number of reasons such as:

- options contracts provide the user with a force majeure characteristic;
- options contracts allow the user to exploit favourable price movements; and
- volatility trends and time-value can be exploited.

It is therefore important to determine whether market participants include options contracts in their trading strategies. This subject was posed to market participants by means of a list question. Since this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.34 reflects a summary of the response received by way of a frequency distribution.

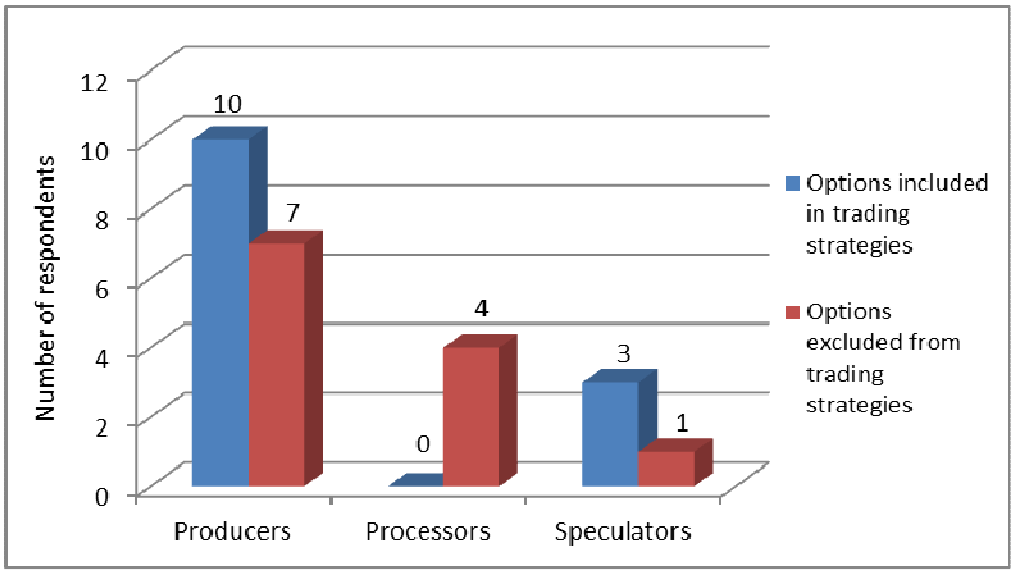

Figure 8.34 Frequency distribution of implementation of options contracts in trading strategies

The graphical presentation confirms that producers and speculators are more likely to make use of options contracts in their alternative trading strategies than is the case with processors. This is consistent with the findings in paragraph 8.8.12, which confirmed

processors hedging a lower percentage of their corn needs with forward contracts and paragraph 8.8.13, which indicated that processors did not view a force majeure characteristic as important as is the case with producers.

Table 8.33 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is summarised in Table 8.34.

Table 8.33 Non-parametric analysis of implementation of options contracts in trading strategies

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	1.0	1.0–2.0	2.0	2	1.0
Processors	4	2	2.0	2.0	-	2.0	2	0.0
Speculators	4	1	1.0	1.0	-	1.6	2	0.6

Table 8.34 Mean response on implementation of options contracts in trading strategies

Stakeholder	**Mean**
Producers	1.4
Processors	2.0
Speculators	1.3

The p-value obtained by means of the Kolmogorov-Smirnov test is lower than the 5% threshold and therefore the result is indeed statistically significant.

8.8.15 Percentage of trading strategies consisting of options contracts

Market participants in the sample population were presented with the ratio question of which percentage of the alternative trading strategies consisted of options contracts. While the proposed price risk management methodology consists of a 100% hedge through at-the-money options, this may not be the case with all marketing strategies applied by producers and processors.

The assessment question included a scale from which respondents were required to exercise their choice:

- 0 = 0% of strategy consists of options contracts
- 1 = 10% of strategy consists of options contracts

- 2 = 20% of strategy consists of options contracts
- 3 = 30% of strategy consists of options contracts
- 4 = 40% of strategy consists of options contracts
- 5 = 50% of strategy consists of options contracts
- 6 = 60% of strategy consists of options contracts
- 7 = 70% of strategy consists of options contracts
- 8 = 80% of strategy consists of options contracts
- 9 = 90% of strategy consists of options contracts
- 10 = 100% of strategy consists of options contracts

Since this question represented ratio data, the following statistical measures were applied:

- graphical illustration and frequency distribution;
- parametric and non-parametric analysis; and
- the Kolgomorov-Smirnov test.

Figure 8.35 provides an illustration of options contracts implemented as a percentage of the total corn volume hedged, while Figure 8.36 presents this data by means of a frequency distribution. Figure 8.35 confirms, through the boxplot method, that producers tend to hedge between 0% and 30% of their expected crop with options contracts. The maximum outlier of 60% suggests that some producers view options contracts as an integral part of their hedging strategy. None of the processors make use of options contracts in the application of their respective trading strategies. The mean diamond graph confirms a mean response of 20% obtained from producers, with the 95% confidence interval at a top of 30% and a bottom of 10%. From these graphs, it is evident that producers in general favour futures and spot contracts to options contracts, while processors are surprisingly reluctant to incorporate options contracts into their procurement strategies.

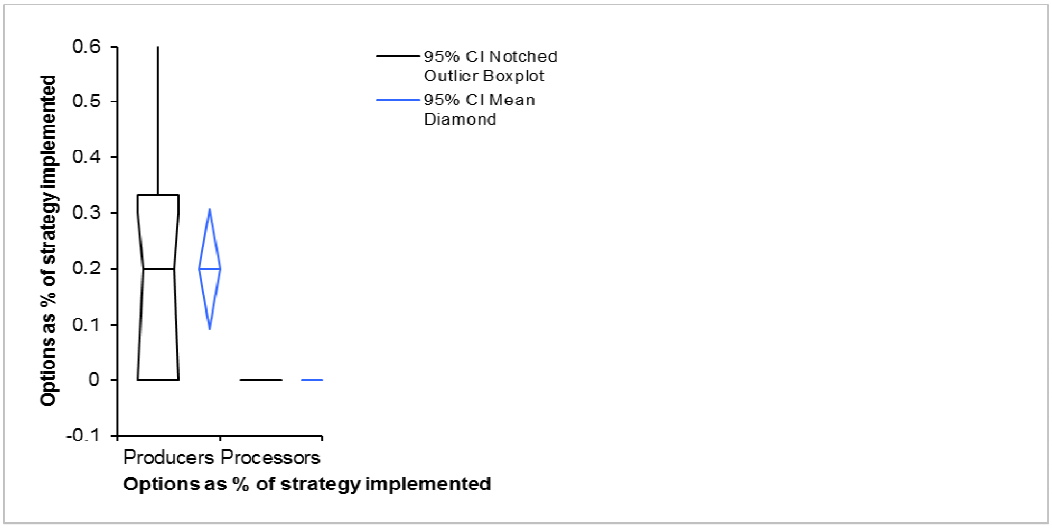

Figure 8.35 Graphical illustration of percentage of trading strategy consisting of options contracts

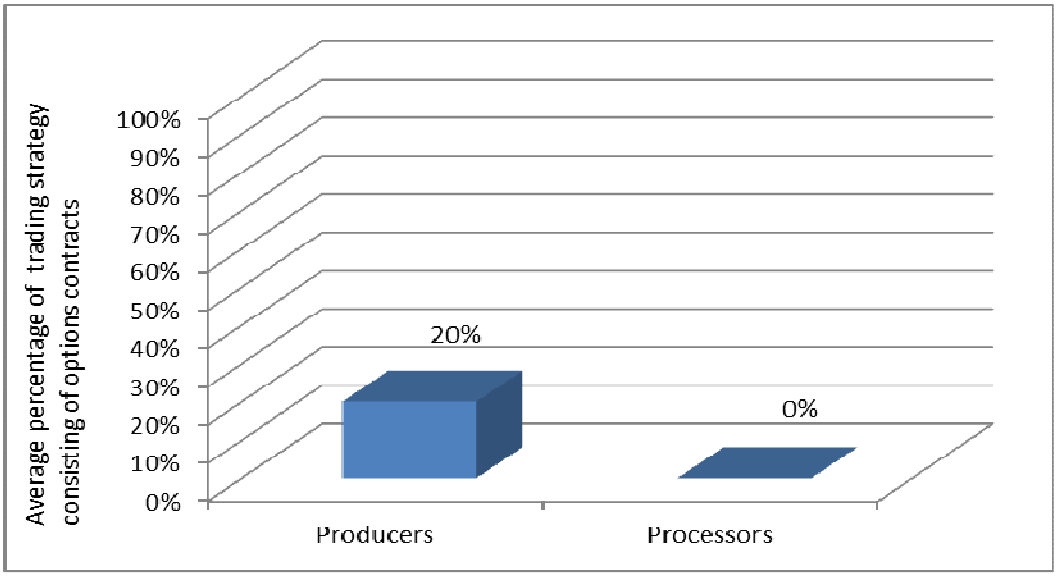

Figure 8.36 Frequency distribution of percentage of trading strategy consisting of options contracts

Table 8.35 highlights the results from the parametric analysis while Table 8.36 reflects a summary of the results from the non-parametric analysis.

Table 8.35 Parametric analysis of percentage of trading strategy consisting of options contracts

Parametric analysis	**N**	**Mean**	**95% CI**	**SE**	**SD**
Producers	17	20.0%	9.2%–30.8%	5.07%	20.92%
Processors	4	0.0%	-	-	-

Table 8.36 Non-parametric analysis of percentage of trading strategy consisting of options contracts

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	0%	0%	20.0%	0%–30%	33.3%	60%	33.3%
Processors	4	0%	0%	0.0%	-	-	0%	0.0%

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.009 and therefore the result is indeed statistically significant.

8.8.16 Ability of trading strategies to adjust to price movement

The proposed price risk management strategy incorporates a systematic methodology whereby the position entered into is adjusted on the basis of certain pre-determined price specifications. This allows the user to keep up with market movement and eliminates the risk of adverse price movements.

In order to determine whether derivative strategies from market participants have a similar feature, the sample population were asked by means of a list question to indicate whether their individual strategies allow for adjustments according to price movements. Since this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.37 reflects a summary of the response received by means of a frequency distribution.

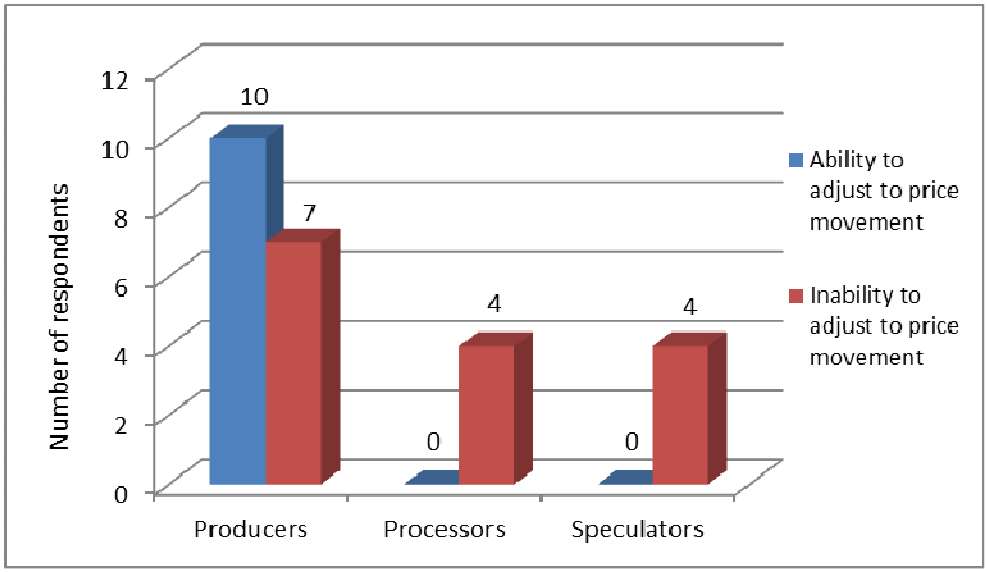

Figure 8.37 Frequency distribution on ability of trading strategies to adjust to price movement

The frequency distribution confirms that the strategies implemented by producers allow for an ability to keep track of price movement, while strategies entered into by processors and speculators do not have this feature. This can be attributed to the reluctance of processors and speculators to incorporate options into their methodology.

Table 8.37 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is summarised in Table 8.38.

Table 8.37 Non-parametric analysis of ability of trading strategies to adjust to price movement

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	1.0	1.0–2.0	2.0	2	1.0
Processors	4	2	2.0	2.0	-	2.0	2	0.0
Speculators	4	2	2.0	2.0		2.0	2	0.0

Table 8.38 Mean response on ability of trading strategies to adjust to price movement

Stakeholder	**Mean**
Producers	1.4
Processors	2.0
Speculators	2.0

The p-value obtained by means of the Kolmogorov-Smirnov test is lower than the 5% threshold and therefore the result is indeed statistically significant.

8.8.17 Ability of trading strategies to exploit price volatility

Price volatility, as described in Chapter 3, remains a major obstacle in the price risk management efforts of market stakeholders. The proposed price risk management strategy attempts to exploit this undue high volatility levels by identifying and acting upon trends in volatility levels.

In order to determine the ability of derivative strategies (implemented by market participants) to benefit from price volatility, the sample population were presented with a list question regarding the ability of their respective strategies to exploit volatility trends. As this question represented ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and calculation of the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.38 reflects a summary of the response received by means of a frequency distribution.

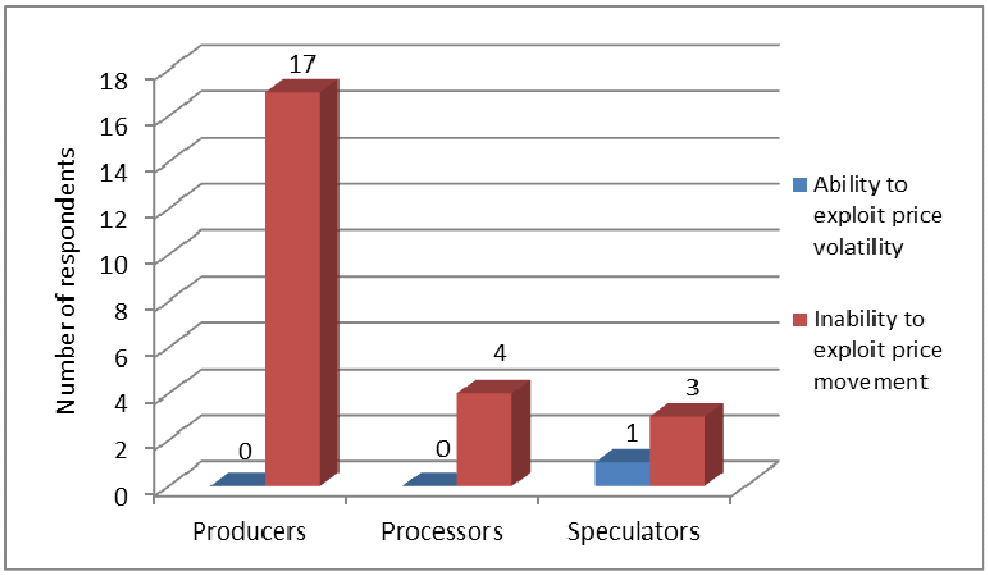

Figure 8.38 Frequency distribution on the ability of trading strategies to exploit price volatility

The frequency distribution confirms that, in general, trading strategies from market participants are not able to exploit volatility levels for the ultimate benefit of the user. Table 8.39 reflects a summary of the results from the non-parametric analysis, while the mean for the alternative stakeholders is summarised in Table 8.40.

Table 8.39 Non-parametric analysis of the ability of trading strategies to exploit price volatility

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	1.0	1.0–1.0	1.0	1	0.0
Processors	4	1	1.0	1.0	-	1.0	1	0.0
Speculators	4	1	1.0	1.0	-	1.6	2	0.6

Table 8.40 Mean response on the ability of trading strategies to exploit price volatility

Stakeholder	**Mean**
Producers	1.0
Processors	1.0
Speculators	1.3

The p-value obtained by means of the Kolmogorov-Smirnov test is lower than the 5% threshold and therefore the result is indeed statistically significant.

8.8.18 Benchmark for measuring trading performance

In order to confirm the benchmark against which returns achieved by the proposed methodology will be measured, market participants in the sample population were asked which return is generally used in order to judge pricing performance. This is important as the methodology was ultimately developed for use by producers, processors and speculators and its return had to correlate with expectations from the appropriate stakeholders.

The assessment question included a Likert-type rating scale from which respondents were required to exercise their choice:

- 1 = Average price over contract life-time
- 2 = Return superior to average price over contract life-time
- 3 = Middle of highest and lowest trade over contract life-time

- 4 = Return superior to spot price at maturity

Since this question represented ordinal data, the following statistical measures were applied:

- graphical illustration and frequency distribution;
- non-parametric analysis and the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.39 provides a graphical illustration on the response received. Figure 8.40 provides a frequency distribution on the same data. Figure 8.39 confirms, through the boxplot method, that producers and processors tend to favour the average price as benchmark for measuring hedging performance. Speculators are divided between the middle of the lowest and highest trade as well as the spot price at contract maturity, with the minimum outlier at 2 and the maximum outlier at 4. The mean diamond confirms the respective mean response obtained from the alternative stakeholders through the horizontal line in the middle of the diamond graph. The mean of the response obtained from producers is 1.9 and that of processors is 1.3, with the top and bottom of the graph representing the respective 95% confidence intervals. Speculators confirmed a mean response of 3.5.

From these graphs, it is obvious that producers and processors strongly favour an average price or superior to average price benchmark. This is in contrast to speculators who view the contract price at maturity as an appropriate level against which performance should be compared.

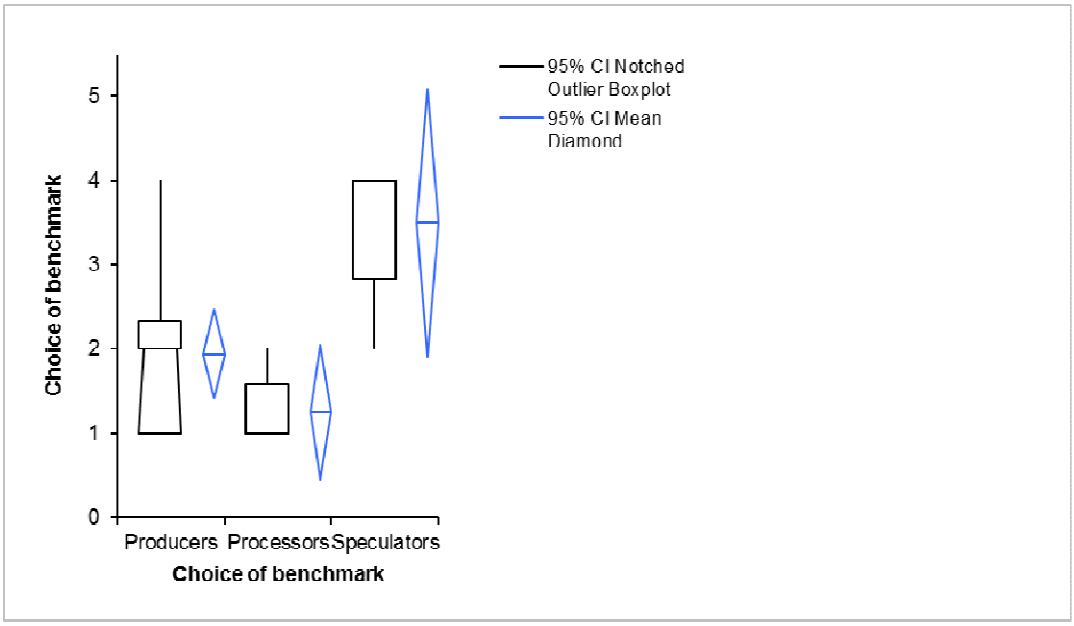

Figure 8.39 Graphical illustration of benchmark return per market stakeholder

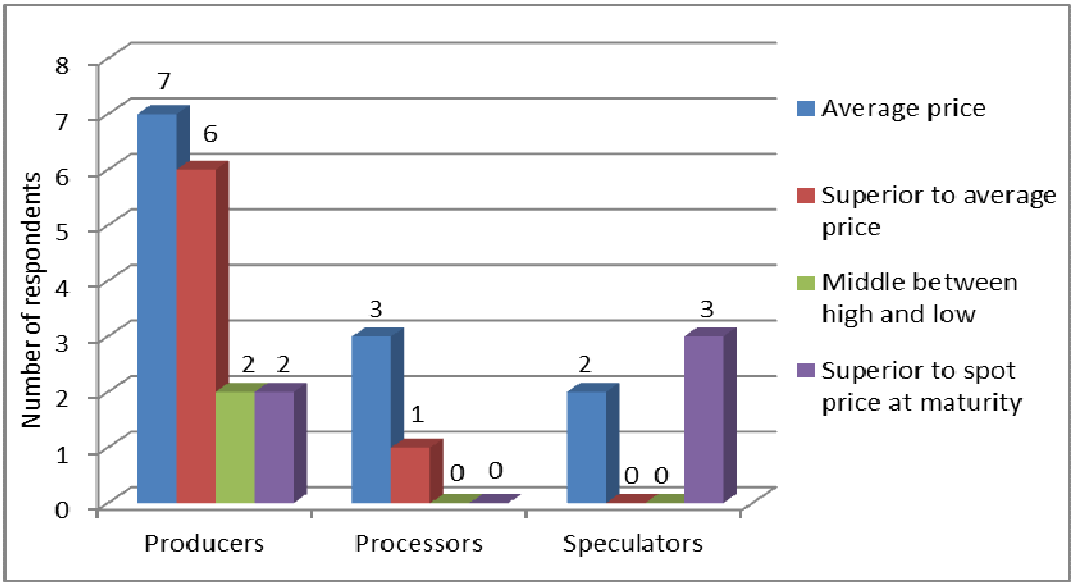

Figure 8.40 Frequency distribution on benchmark return per market stakeholder

Table 8.41 highlights the results from the non-parametric analysis, while Table 8.42 reflects a summary of the mean response per group of stakeholder.

Table 8.41 Non-parametric analysis of choice of benchmark price level

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	1	1.0	2.0	1.0–2.0	2.3	4	1.3
Processors	4	1	1.0	1.0	-	1.6	2	0.6
Speculators	4	2	2.8	4.0	-	4.0	4	1.2

Table 8.42 Mean response on choice of benchmark price level

Stakeholder	Mean
Producers	1.9
Processors	1.3
Speculators	3.5

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.009 and therefore the result is indeed statistically significant.

8.8.19 Assessing the proposed methodology

Questions 20 – 22 are seen as complementing each other and they will therefore be evaluated simultaneously.

- It is important to determine whether a price risk management methodology, as proposed in the study, already exists. Participants in the research sample were therefore asked to indicate whether they have taken notice of a derivative strategy which has proved to yield above-average returns, notwithstanding the market trend, while also incorporating a force majeure characteristic.
- The research sample was asked to indicate whether they would consider implementing such a strategy (should it exist).
- Since the objective of any derivative strategy should be to improve or create social welfare, the research sample was asked whether such a methodology would in fact have a significant positive impact on business profitability.

Since all of the list questions obtained ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.41 reflects a summary of the response on all three questions by means of a frequency distribution. From this illustration, the following conclusions could be drawn:

- none of the respondents had taken notice of a strategy which included the relevant characteristics;
- all of the respondents agreed that such a strategy would indeed prove to be popular among all market participants; and
- all of the respondents anticipated an increase in profitability as a result of the implementation of such a methodology.

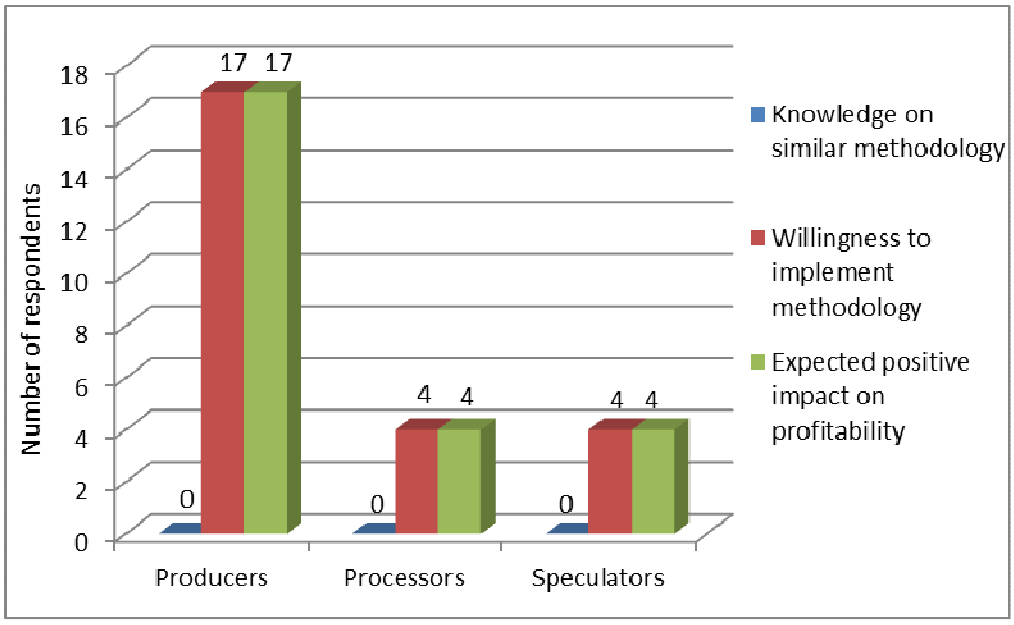

Figure 8.41 Frequency distribution on assessment of methodology

Tables 8.43, 8.44 and 8.45 highlights the results from the non-parametric analysis.

Table 8.43 Non-parametric analysis of knowledge of strategy encompassing distinctive features

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	1	1.0	1.0	1.0–1.0	1.0	1	0.0
Processors	4	1	1.0	1.0	-	1.0	1	0.0
Speculators	4	1	1.0	1.0	-	1.0	1	0.0

Table 8.44 Non-parametric analysis of willingness to implement proposed methodology

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	2	2.0	2.0	2.0–2.0	2.0	2	0.0
Processors	4	2	2.0	2.0	-	2.0	2	0.0
Speculators	4	2	2.0	2.0	-	2.0	2	0.0

Table 8.45 Non-parametric analysis of impact of methodology on business profitability

Non-parametric analysis	N	Min	1st Quartile	Median	95% CI	3rd Quartile	Max	IQR
Producers	17	2	2.0	2.0	2.0–2.0	2.0	2	0.0
Processors	4	2	2.0	2.0	-	2.0	2	0.0
Speculators	4	2	2.0	2.0	-	2.0	2	0.0

Table 8.46, 8.47 and 8.48 presents the mean response from the three list questions.

Table 8.46 Mean response on knowledge of strategy encompassing distinctive features

Stakeholder	Mean
Producers	1.0
Processors	1.0
Speculators	1.0

Table 8.47 Mean response on willingness to implement proposed methodology

Stakeholder	Mean
Producers	2.0
Processors	2.0
Speculators	2.0

Table 8.48 Mean response on impact of methodology on business profitability

Stakeholder	Mean
Producers	2.0
Processors	2.0
Speculators	2.0

The p-value for each of the questions obtained by means of the Kolmogorov-Smirnov test is lower than the threshold of 5% and therefore the results are indeed statistically significant.

8.8.20 Cost associated with implementation of methodology

The option cost incurred in the implementation of the proposed price risk management methodology is minimised through the exploitation of price and volatility trends. The realised price against which the benchmark return is compared already reflects the impact of the cost of option contracts and it is therefore a net realised price, which is presented in contesting the efficient market hypothesis. For interest sake, the sample population was asked what price they would be willing to pay for a methodology exhibiting characteristics as discussed in paragraph 8.8.19.

The assessment question included a Likert-type rating scale from which respondents were required to exercise their choice:

- 1 = 0%–2.5% of the realised price
- 2 = 2.5%–5% of the realised price
- 3 = 5%–7.5% of the realised price
- 4 = 7.5%–10% of the realised price

Since the question provided the user with ordinal data, the following statistical measures were applied:

- graphical illustration and frequency distribution;
- non-parametric analysis and the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.42 provides a graphical illustration of the response received, with a summary presented by means of a frequency distribution in Figure 8.43. The boxplot graph in Figure 8.42 indicates that the majority of producers are willing to pay up to 5% of the realised price for the trading methodology, with a maximum outlier at a level of 3 (5%–7.5% of the realised price). The response from the majority of processors indicates a level of between 1.5 and 2, while that of speculators is between 1 and 1.7. The horizontal line in the mean diamond graph indicates a mean response from producers and processors of 1.8, while the mean response from speculators is slightly lower at 1.3. Consistent with the lower mean response from processors, the top and bottom of the 95% confidence interval are lower as well.

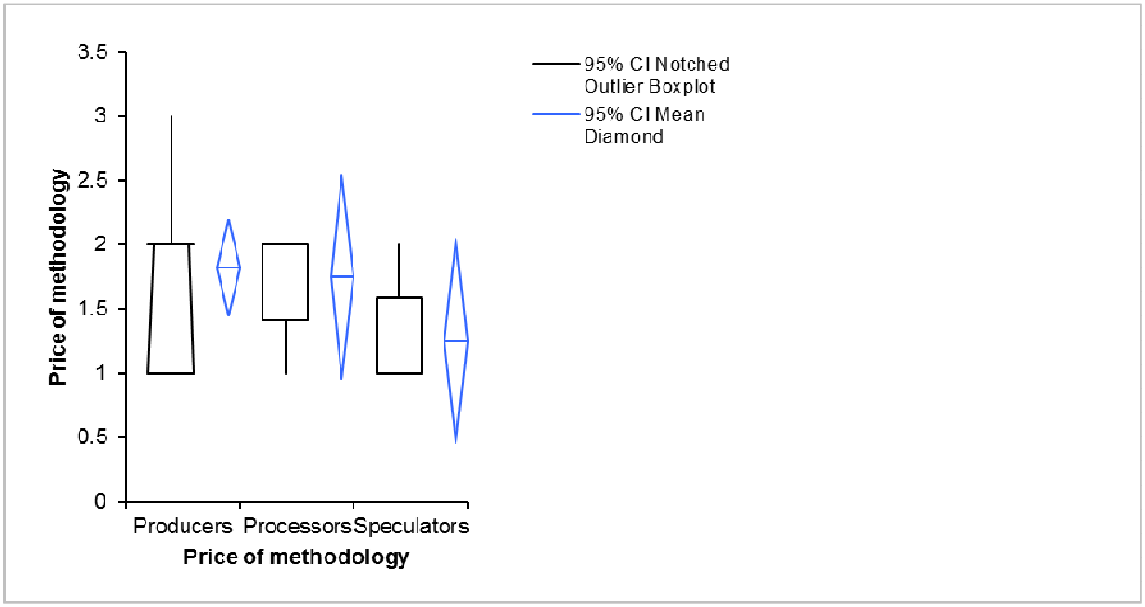

Figure 8.42 Graphical presentation of cost associated with methodology

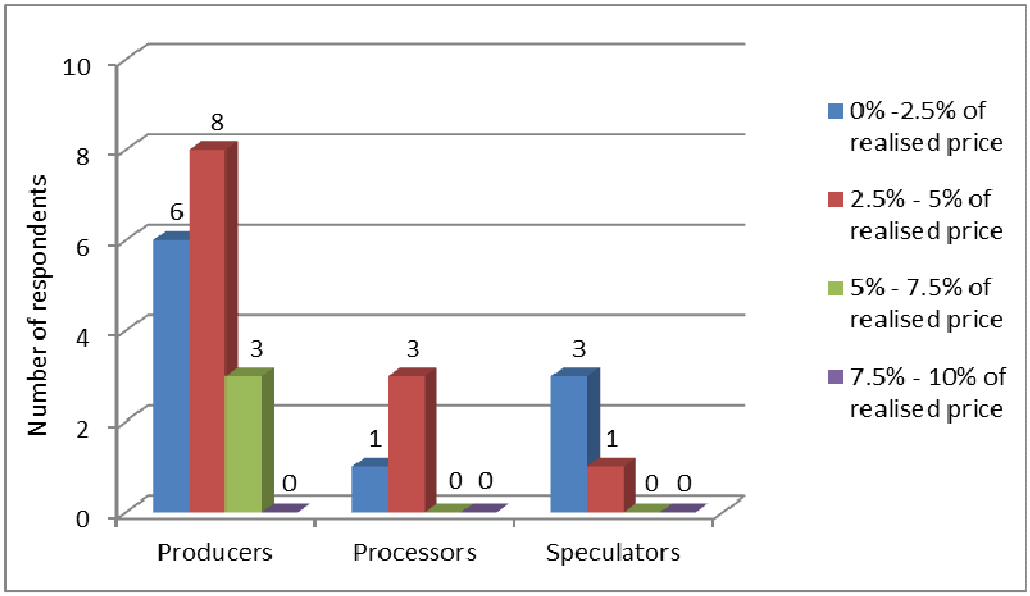

Figure 8.43 Frequency distribution of cost associated with methodology

Table 8.49 highlights the results from the non-parametric analysis while Table 8.50 reflects a summary of the mean response obtained from the sample population.

Table 8.49 Non-parametric analysis of cost associated with methodology

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	2.0	1.0–2.0	2.0	3	1.0
Processors	4	1	1.4	2.0	-	2.0	2	0.6
Speculators	4	1	1.0	1.0	-	1.6	2	0.6

Table 8.50 Mean response regarding cost associated with methodology

Stakeholder	**Mean**
Producers	1.8
Processors	1.8
Speculators	1.3

The p-value obtained by means of the Kolmogorov-Smirnov test is <0.009 and therefore the result is indeed statistically significant.

8.8.21 Ability to implement methodology

Questions 24–26 all focus on the ability of market participants to actually implement the proposed methodology and will therefore be evaluated simultaneously. The following are required in order for participants to be able to apply the methodology to corn futures prices:

- access to live corn futures prices (directly, or indirectly through broker);
- access to live technical analysis data (directly, or indirectly through broker); and
- a continuous ability to enter into trades.

The sample population was required to indicate by answering list questions whether they complied with the above requirements. Since all of the list questions obtained ordinal data, the following statistical measures were applied:

- frequency distribution;
- non-parametric analysis and the mean; and
- the Kolgomorov-Smirnov test.

Figure 8.44 illustrates the response from the sample population on the three questions. As depicted by the frequency distribution, all of the respondents had live access to corn futures prices, technical market data and the ability to trade derivatives with corn as the underlying asset on a continuous basis.

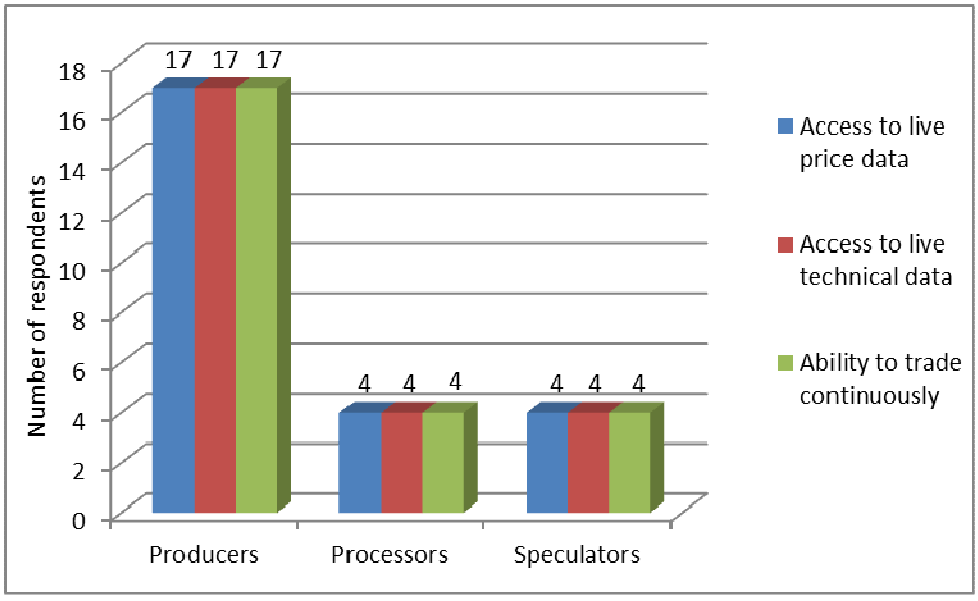

Figure 8.44 Frequency distribution of feasibility of methodology

Since the respondents indicated that they did comply with all the relevant requirements, it was concluded that they would be able to implement the particular proposed methodology upon receipt of the technical trading signals or indicators. Given the similarity in the feedback received from respondents for the three questions, the non-parametric results, mean distribution and Kolgomorov-Smirnov test results were exactly the same. The non-parametric results are presented in Table 8.51, while the mean distribution is summarised in Table 8.52.

Table 8.51 Non-parametric analysis on ability to implement methodology

Non-parametric analysis	**N**	**Min**	**1st Quartile**	**Median**	**95% CI**	**3rd Quartile**	**Max**	**IQR**
Producers	17	1	1.0	1.0	1.0–1.0	1.0	1	0.0
Processors	4	1	1.0	1.0	-	1.0	1	0.0
Speculators	4	1	1.0	1.0	-	1.0	1	0.0

Table 8.52 Mean response on ability to implement methodology

Stakeholder	**Mean**
Producers	1.0
Processors	1.0
Speculators	1.0

The p-value for each of the questions obtained by means of the Kolmogorov-Smirnov test is lower than the threshold of 5% and therefore the results are indeed statistically significant.

The following section provides a summary of the results from the feedback received.

8.9 CONCLUSIONS AND REPORTING ON RESEARCH FINDINGS

The final stage of the business research process entails the communication of the research results. Given the analysis conducted in response to feedback received by means of the questionnaire, the researcher was able to come to the following conclusions.

8.9.1 Level of financial exposure to corn price fluctuations

The response received by the alternative groups of stakeholders who were approached by means of the assessment instrument confirmed the magnitude of financial risk to which stakeholders are exposed as a result of corn price fluctuations.

This correlates with earlier findings as discussed in Chapter 4, where it was concluded that producers commonly rate commodity price risk as the least manageable factor threatening the social welfare of their businesses. Processors reported dramatic declines in operating profits as a result of unexpected market movement, while speculators were consistently looking for ways to enhance their price-forecasting ability.

8.9.2 Impact of corn price on business profitability

The analysis of the response received confirmed that producers and speculators were directly impacted by corn price volatility, with processors undecided on the subject.

This conclusion is consistent with the literature study conducted in Chapter 4, with the addition that the literature study confirmed the direct impact of price volatility on the operating profit of processors. This is also highly correlated with the findings of the researcher in an earlier study regarding the effect of price movement on the profits of processors (Rossouw 2008; Rossouw & Young 2009).

8.9.3 Predominant trend in corn price volatility

Respondents agreed overwhelmingly that the overall trend in corn price volatility is increasing. This finding is supported by Irwin and Good (2009) as discussed in detail in Chapter 3.

8.9.4 Impact of price volatility on hedging decisions

All of the respondents agreed that increased volatility levels have a significant impact on the hedging decisions of their respective businesses.

8.9.5 Price forecasting as counter against price volatility

The predominant price risk management trading strategy of stakeholders in the corn futures market is based upon a price-forecasting mechanism, whereby producers,

processors and speculators aim to anticipate future price movements of the underlying asset.

8.9.6 Market analysis applied as means of price forecasting

Surprisingly few respondents make use of trend analysis (as described in Chapter 7) in anticipation of future price movements. The majority of producers and processors favoured fundamental analysis as a means of forecasting prices, while speculators preferred technical analysis (refer to Chapter 6) in forecasting prices.

8.9.7 Price-forecasting success

The majority of stakeholders confirmed an average/below-average success rate in forecasting the future price movement of corn futures contracts. This is consistent with the literature study conducted on price forecasting of futures prices in Chapter 5.

8.9.8 Level of success achieved through price forecasting

The feedback received indicated that producers, processors and speculators (on average) achieved moderate success at best in anticipating price movement.

8.9.9 Consistency of price forecasts

The respondents from the sample population unanimously confirmed that they were not able to predict future price movements consistently and therefore they were unable to outperform the market throughout. This finding is supportive of the efficient market hypothesis as detailed in Chapter 5.

8.9.10 Type of trading strategy implemented

Producers and processors are reluctant to adjust their respective trading strategies, while speculators tend to be more willing to adapt to the market environment through alternative methodologies. The lack of knowledge from market participants on the working of the futures market (as discussed in Chapter 4) is a major stumbling block preventing traders from developing and implementing strategies which mitigate price risk.

8.9.11 Impact of price trends on strategy applied

Producers and processors are reluctant to alter their trading strategies based on the price trend of the market. In contrast to this, speculators indicated that they were more willing to react to changing price trends.

8.9.12 Percentage of corn crop/usage hedged before contract maturity

Both producers and processors were reluctant to hedge themselves with derivative contracts. While producers, on average, hedged up to half of their expectant crop through either options or futures contracts, processors were only willing to hedge one-tenth of their expected usage before contract maturity.

8.9.13 Importance of force majeure characteristic in trading strategy

Since processors hedge very little of their usage outside of the spot market, they tend to place less emphasis on the importance of a force majeure than do producers. By incorporating a force majeure into their trading strategies, processors and producers can hedge a bigger percentage of their usage/crop when prices offer profitable opportunities since these stakeholders will not be obliged to take/make delivery.

8.9.14 Options contracts incorporated in trading strategy

Similar to the conclusion made in paragraph 8.9.14, producers and speculators tend to make more use of options contracts in their trading strategies than is the case with processors.

8.9.15 Percentage of trading strategies consisting of options contracts

Producers favoured futures contracts and spot contracts to options, while processors were surprisingly reluctant to hedge price movement with options contracts.

8.9.16 Ability of trading strategies to adjust to price movement

The trading strategies applied by producers were better adjusted to keep track of price movement than the strategies of both processors and speculators. This can be attributed to producers incorporating a bigger percentage of options contracts into their trading methodologies than is the case with other market stakeholders.

8.9.17 Ability of trading strategies to exploit price volatility

The trading methodologies or strategies applied by market stakeholders are not able to exploit price volatility. This conclusion should be seen alongside paragraph 8.9.6 where it was determined that stakeholders in this study did not make use of trend analysis in developing their respective derivative strategies. If a trader is not aware of a trend, it cannot be exploited.

8.9.18 Benchmark for measuring trading performance

Producers and processors strongly favoured an average price as benchmark. In the next chapter, this conclusion will be compared to market standards.

8.9.19 Assessment of proposed methodology

All respondents agreed unanimously that:

- they have not taken notice of a derivative price risk management methodology which consistently outperforms a predetermined benchmark while incorporating a force majeure;
- they would be willing to implement such a methodology, should it exist; and
- such a methodology will have a significant impact on business profitability.

8.9.20 Cost associated with implementation of methodology

Respondents agreed that, on average, they would be willing to pay up to 5% of the realised price in order to obtain the methodology as presented in this study.

8.9.21 Ability to implement methodology

The feasibility of the proposed methodology is subject to stakeholders being able to implement it. Respondents confirmed that they had access to live futures prices and technical data, and that they were able to trade derivatives on a continuous basis. Since these conditions were met, the methodology was deemed feasible for purposes of implementation.

8.10 SUMMARY AND CONCLUSIONS

Empirical research ought to include an implicit or explicit research design and methodology which connect empirical data to the initial research question and ultimately its conclusions. The research design is the blueprint of the research conducted as it is the plan according to which research participants are obtained and information derived from the relevant participants.

Business research is the application of scientific methods in the search of answers regarding business phenomena. This process involves a logical sequence of interrelated and overlapping activities. The business research process can be categorised into six successive stages, namely:

- the definition of research objectives;
- planning of the research design;
- planning of the research sample;
- collection of data;
- data processing and analysis; and
- the eventual research conclusions.

The research objectives of a study are classified as the problem statement, research question and the objectives itself. This stage within the business research process focuses on the ultimate goal or objective of the study conducted and consists of clear and specific statements identifying what the researcher wishes to accomplish through the research itself.

Three alternative types of research design categories can be identified, namely exploratory research, descriptive research and causal research. Exploratory research methods are qualitative in nature and mainly focus on secondary data. Descriptive research methods are quantitative in nature, while causal research relates to experiments. The current study exhibited characteristics of both exploratory research and descriptive research. The exploratory research is represented by means of an extensive literature review while a structured, self-administered questionnaire featured through descriptive research.

Sampling is the process by which certain entities are selected from the broader population in order to collect relevant data with the objective of meeting the research objectives. This study made use of non-probability sampling, in particular by using purposive sampling.

Data gathering entails all of the actions involved in collecting information with the objective of addressing the research problem. Once gathered, the raw data has little meaning and needs to be processed into applicable and accurate information before the results are communicated and conclusions drawn.

Chapter 9 will provide a detailed description of the proposed price risk management methodology, as well as comparing the returns achieved by the methodology against that of a pre-determined market benchmark.

CHAPTER 9
EMPIRICAL RESEARCH FINDINGS AND PERFORMANCE MEASUREMENT

9.1 INTRODUCTION

Chapter 8 defined the business research process and discussed each of the overlapping, but clearly distinguishable stages, in comprehensive detail. In particular, attention centred on the development of a research design for this study, which would connect the empirical data to the initial research question and ultimately its conclusions. It was determined that the study exhibited characteristics of both exploratory research and descriptive research.

Exploratory research during the study was reported in an extensive literature review while a structured, self-administered questionnaire featured in the form of descriptive research. Sampling was conducted by means of a purposive, non-probability sampling strategy which did not adhere to the theory of probability when selecting the sample from the population.

This chapter can be divided into three sections, which will follow a logical sequence. The first section will focus on the conclusions derived from earlier chapters, after which the conclusions will be combined in order to provide a detailed description of the actual proposed price risk management methodology. The second section of this chapter will identify the appropriate market benchmark for corn futures trading. Once this benchmark has been established, the returns achieved from the application of the proposed price risk management methodology on historical price data and a series of random data sets will be compared to those of the chosen benchmark. These comparisons in the third section will ultimately result in the acceptance or rejection of the methodology as a means of managing price risk and volatility.

9.2 IMPORTANCE OF CONCLUSIONS DERIVED FROM EARLIER CHAPTERS

This research project produced several distinct features of derivative instruments with corn as the underlying asset, as reported in earlier chapters. Each of these chapters incorporated important characteristics which were included in the proposed methodology. This section will discuss the relevant chapters and conclusions which will feature in the price risk management methodology as presented in paragraph 9.3.

9.2.1 Pricing of options

While Chapter 2 consisted predominantly of a theoretical discussion on futures markets, it also provided a formula on the pricing of options premiums. An important conclusion was that the premium of an option contract is determined mainly by time value until expiration, as well as price volatility.

The methodology will consequently aim to implement options at the lowest possible cost. This will be achieved by lessening the impact of time value and exploiting price volatility.

9.2.2 Price volatility

Chapter 3 discussed price volatility, its determinants as well as seasonality in volatility. Since volatility tends to follow a seasonal pattern, the methodology will aim to exploit this by purchasing options contracts at a low volatility basis and selling options at seasonal volatility peaks.

9.2.3 Implementation of methodology

The relatively weak price risk management performance of stakeholders was confirmed in Chapter 4. An important consideration included in this chapter was that stakeholders do not possess sufficient knowledge on the working of derivative instruments and the futures market to mitigate price risk successfully and effectively.

The methodology will therefore propose certain fixed rules whereby trading decisions will be taken. This will provide users with the opportunity to manage risk in a manner whereby specialised knowledge on the futures market is not a necessity.

9.2.4 Technical analysis

Chapter 6 discussed technical analysis as a price-forecasting mechanism. Certain oscillators were identified as leading indicators, which will be incorporated into the methodology as support for the anticipation of price movements.

9.2.5 Price and volatility trends

Historical price data and previous research confirmed the existence of price and volatility trends in Chapter 7. By entering into a strategy on the basis of certain trends, the proposed methodology will allow the user to exploit market movement.

Therefore, the methodology proposed in the following section will attempt to exploit time value of options, volatility and price trends and technical trading in ultimately contesting the efficient market hypothesis.

9.3 PROPOSED PRICE RISK MANAGEMENT METHODOLOGY

In contesting the notion of the efficient market hypothesis, it is proposed that a combination of technical analysis and observable market trends can be exploited in a manner that will enable the trader to achieve returns superior to those offered by the market. This section will aim to describe the background on the methodology underlying the trading strategy.

For the purposes of this study, the methodology was applied to the main CBOT corn delivery month (December) over the course of the calendar year (first trading day to last trading day of the specific futures contract).

9.3.1 Price risk management methodology

The methodology is discussed with reference to particular trading dates.

9.3.1.1 1 January – 30 April

For the period 1 January to 30 April, the producer (processor) and speculator entered into trading transactions once all of the technical indicators had been aligned simultaneously in a sell (buy) signal as discussed in Chapter 6. This included the RSI >70% (<30%),

stochastic indicator >70% (<30%) and the 9-day moving average > (<) 21-day moving average. If no trading signal had been received before 30 April, the trades had to be entered into automatically on 30 April notwithstanding the absence of technical signals.

These transactions included:

- On the first day a sell (buy) signal was indicated, the producer (processor) entered into an at-the-money long put (call) position. The purpose of the methodology was to mitigate price risk. By engaging into a long at-the-money option, the risk of adverse price movements was addressed while still providing the option holder with the force majeure characteristic, which eliminated the risk of delivery. This trade was entered into specifically before 30 April as option volatility on average tended to increase dramatically from May onward (refer to Chapter 7), which resulted in a higher option premium (refer to Chapter 2).
- In an attempt to exploit volatility movement, a 20% out-of-the money put (call) option was also purchased with the objective of selling the option at a higher volatility level and therefore option premium during the next buy (sell) signal.
- The long option positions entered into may have proved to be quite expensive given the duration until option expiration. In an attempt to soften the initial option cost, the trader should have exploited the time value of options (refer to Chapter 2) by selling a 20% out-of-the money call (put) option. This option trade was reversed on the following buy (sell) signal after gaining time value. Had the 20% out-of-the money option proved to be worthless (i.e. worth $0.01 or less), it would have been bought instead as the maximum risk equalled possible transaction costs.

9.3.1.2 1 January to last trading day

- It was important to monitor the long at-the-money put (call) position continuously throughout the course of the trading year. On each of the successive sell (buy) signals the strike level of the long option was compared to the current market price. In the instance where the current futures price on a sell (buy) signal was trading higher (lower) than the original strike price by 10% or more, the long put (call) option had been sold and replaced with an at-the-money long put (call) option. This is referred to as rolling the option up (down) and this took place until option expiration. The original at-the-money option was sold only in the instance where the option was worth $0.01 or less, otherwise it was carried forward to the following signal. By doing this, the strategy

allowed the user to move with the market and continuously achieve higher (lower) minimum (maximum) price levels.

- The 20% out-of-the money put (call) option was sold on the following buy (sell) signal, except when it was worthless (in this case, it was carried forward to the next trading signal). Given the volatility trend identified in Chapter 7, it was more than likely that this would occur at higher volatility levels. In order to exploit the higher volatility levels, the option was replaced with a short 20% out-of-the money put (call) option, only if the option was worth more than $0.01. Had the futures price moved beyond the strike of the short option, it had to be hedged through delta trading of futures contracts. The option was liquidated on the next sell (buy) signal.
- The short 20% out-of-the money call (put) option was reversed on the following buy (sell) signal after gaining time value. This was done if the option was worth $0.01 or less, otherwise it was carried forward to the following signal. Had the futures price moved beyond the strike of the short option, it had to be hedged through delta trading of futures contracts. In the instance where the option was initially worthless and as a result a long position call (put) option was entered into, the option was reversed on the following sell (buy) signal.

9.3.1.3 Option expiration

On option expiration, the producer (processor) ended up with one short (long) futures position for every long option contract initially entered into.

The speculator had no positions as the short future and long future offset each other. Therefore:

- If the long put (call) option was in-the-money on option expiration, a short (long) futures contract would automatically be realised through the exchange. If the long put (call) option was out-of-the-money on option expiration, the producer (processor) would enter into a short (long) futures contract at current market prices. The same scenario applied to speculators.
- Had the put (call) option still been open and worthless, it would have expired without any addition of futures contracts. If the long option was in-the-money, profit should have been taken by the trader at current market levels. If the short option was in-the-

money, it should already have been mitigated by means of delta transactions and therefore not impacted on the net futures position.

- Had the short put (call) option still been open and worthless, it would have expired without any addition of futures contracts. If the short option was in-the-money, it should already have been mitigated by means of delta transactions and therefore not impacted on the net futures position.

9.3.2 Application of methodology on historical data

In order to clarify the methodology as discussed in paragraph 9.3.1 further, an example on the application thereof is provided in Tables 9.1 and 9.2. For the purposes of the example, the methodology was applied on the December 2009 CBOT corn futures contract.

Table 9.1 details the calculation and determination of buy and sell signals, while Table 9.2 reflects a summary of the methodology.

Table 9.1 Calculation of trading signals

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20081203	393.00	398.00	394.25							
20081204	379.75	392.00	379.25							
20081205	349.25	368.00	351.25							
20081208	369.00	377.50	373.75							
20081209	369.50	381.00	372.25							
20081210	379.00	388.00	387.25							
20081211	384.75	401.00	396.50							
20081212	385.00	425.25	420.00							
20081215	421.00	437.00	422.50				388.56			
20081216	425.75	443.50	441.50				393.81			
20081217	429.50	449.00	435.25				400.03			
20081218	427.00	435.00	434.75				409.31			
20081219	419.75	428.00	425.00				415.00			
20081222	423.25	427.50	427.00				421.08			
20081223	427.25	439.00	439.75				426.92			
20081224	436.75	441.00	441.50	87.05		70.18	431.92			
20081226	442.25	457.50	456.50	94.03		73.01	435.97			
20081229	437.50	464.00	438.25	88.03	89.70	64.94	437.72			
20081230	433.00	442.00	440.75	81.42	87.83	65.50	437.64			
20081231	435.50	450.00	451.50	76.54	82.00	67.89	439.44			
20090102	446.50	457.00	456.25	82.35	80.11	68.91	441.83	418.33		
20090105	448.50	458.50	455.25	84.88	81.26	68.42	445.19	421.24		
20090106	457.75	471.50	471.25	89.98	85.74	71.89	450.11	425.62	471.25	
20090107	458.00	463.50	460.50	86.16	87.01	66.59	452.42	430.82		
20090108	450.00	459.50	450.25	79.07	85.07	61.91	453.39	434.46		
20090109	452.00	459.50	454.25	68.12	77.78	63.00	453.14	438.37		
20090112	424.25	429.50	424.25	42.56	63.25	51.14	451.58	440.13		
20090113	407.50	421.75	407.00	22.65	44.44	45.80	447.83	440.63		
20090114	404.50	413.00	411.50	3.91	23.04	47.34	443.39	440.23		
20090115	405.00	414.50	411.00	6.46	11.01	47.18	438.36	439.68		
20090116	419.00	437.00	436.75	22.76	11.04	55.56	436.31	439.45		
20090120	424.50	447.50	430.00	31.97	20.39	53.18	431.72	439.20		
20090121	424.00	434.50	435.75	44.28	33.00	54.95	428.97	439.25		
20090122	424.50	433.75	433.50	42.66	39.64	54.09	427.11	439.65		
20090123	430.50	445.00	436.00	45.65	44.20	54.93	425.08	440.08		
20090126	437.00	445.50	439.00	47.26	45.19	55.98	426.72	440.05		
20090127	422.50	432.00	423.00	43.29	45.40	49.38	428.50	439.17		
20090128	419.00	430.25	430.00	43.07	44.54	52.05	430.56	437.90		
20090129	424.50	428.25	427.25	39.69	42.02	50.91	432.36	437.38		
20090130	425.00	430.00	425.00	45.13	42.63	49.96	431.06	436.63		
20090202	410.00	418.50	416.00	38.59	41.14	46.21	429.50	434.94		
20090203	401.75	411.00	406.25	28.08	37.27	42.49	426.22	432.56		
20090204	401.50	412.25	401.75	12.37	26.35	40.86	422.69	430.01		
20090205	403.75	415.00	415.25	13.42	17.96	47.39	420.39	427.35		
20090206	416.25	423.50	421.75	24.82	16.87	50.24	418.47	425.50		
20090209	421.50	426.75	421.75	39.98	26.07	50.24	418.33	424.14		
20090210	413.00	423.50	420.50	44.41	36.40	49.64	417.28	422.54		
20090211	409.75	419.00	410.00	36.17	40.19	44.80	415.36	421.86		
20090212	407.50	417.50	407.75	25.57	35.38	43.82	413.44	421.89		
20090213	405.50	410.25	405.50	15.55	25.76	42.80	412.28	421.61		
20090217	388.00	398.75	390.25	10.88	17.33	36.62	410.50	420.62		
20090218	386.00	391.25	387.50	7.28	11.24	35.62	408.92	418.27		
20090219	390.75	395.50	393.75	8.78	8.98	39.65	406.53	416.55		
20090220	382.00	391.50	389.75	12.78	9.62	38.01	402.97	414.36		
20090223	390.00	396.50	391.50	18.72	13.43	39.19	399.61	412.36		
20090224	386.75	394.00	394.25	21.97	17.82	41.10	396.69	410.37		
20090225	390.75	407.75	403.75	32.40	24.37	47.25	396.00	408.69		
20090226	398.00	410.00	402.25	40.41	31.60	46.43	395.39	407.70		
20090227	389.00	397.00	391.00	37.99	36.93	40.69	393.78	405.85		
20090302	375.50	382.00	380.25	25.09	34.49	36.10	392.67	403.61		
20090303	378.25	383.50	380.75	14.03	25.70	36.46	391.92	401.50		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20090304	387.50	395.00	393.75	21.81	20.31	45.10	391.92	400.44		
20090305	386.50	391.50	387.75	30.26	22.03	42.24	391.69	399.56		
20090306	389.50	394.00	390.75	40.97	31.01	44.15	391.61	399.04		
20090309	395.50	399.50	396.00	46.29	39.17	47.41	391.81	398.12		
20090310	406.00	412.50	406.75	62.69	49.98	53.42	392.14	397.40		
20090311	395.00	410.25	396.00	66.43	58.47	47.57	391.44	396.18		
20090312	399.75	417.50	415.75	78.57	69.23	56.91	394.19	395.95		
20090313	413.50	419.00	418.00	82.98	75.99	57.83	398.39	396.33		
20090316	418.00	426.75	421.25	94.27	85.27	59.19	402.89	396.98		
20090317	419.00	424.00	420.75	91.75	89.67	58.87	405.89	397.70		
20090318	416.00	421.50	418.75	87.32	91.11	57.56	409.33	399.06		
20090319	426.00	434.00	428.25	87.62	88.90	61.91	413.50	401.00		
20090320	426.75	429.50	428.00	87.93	87.62	61.73	417.06	402.63		
20090323	425.00	434.50	427.25	88.10	87.88	61.16	419.33	404.42		
20090324	424.00	428.00	425.25	84.95	87.00	59.57	422.58	406.02		
20090325	416.75	421.00	417.50	75.95	83.00	53.75	422.78	407.13		
20090326	420.00	423.50	422.75	71.07	77.32	56.83	423.31	408.04		
20090327	417.25	420.50	419.25	64.62	70.55	54.24	423.08	408.85		
20090330	411.50	419.00	418.25	63.50	66.40	53.49	422.81	410.14		
20090331	414.00	436.75	435.75	72.52	66.88	63.11	424.69	412.79		
20090401	424.00	432.00	427.25	72.84	69.62	56.95	424.58	415.00		
20090402	431.00	437.50	433.75	81.75	75.70	60.15	425.22	416.90		
20090403	429.00	435.50	435.50	80.09	78.23	60.99	426.14	419.18		
20090406	432.25	437.00	436.75	91.67	84.50	61.61	427.42	421.37		
20090407	426.75	434.50	427.50	83.65	85.14	54.65	428.53	422.87		
20090408	423.00	433.00	427.75	73.72	83.01	54.80	429.08	423.87		
20090409	421.00	435.50	421.75	54.49	70.62	50.52	429.36	425.10		
20090413	415.00	420.50	419.25	43.91	57.37	48.81	429.47	425.26		
20090414	419.50	428.25	424.75	40.06	46.15	52.61	428.25	425.58		
20090415	415.25	422.50	415.25	31.73	38.57	46.23	426.92	425.30		
20090416	412.00	417.00	416.75	28.53	33.44	47.31	425.03	425.11		
20090417	406.50	417.75	407.00	12.08	24.11	41.45	421.86	424.55		
20090420	390.50	400.50	398.75	13.12	17.91	37.24	417.64	423.14		
20090421	399.50	408.00	403.50	15.61	13.60	40.95	414.97	421.98		
20090422	400.00	407.00	403.25	24.11	17.61	40.82	412.25	420.83		
20090423	406.50	411.50	411.50	33.32	24.35	47.11	411.11	420.18		
20090424	404.75	416.25	406.75	35.75	31.06	44.19	409.72	419.67		
20090427	396.00	404.00	401.50	34.85	34.64	41.17	407.14	418.65		
20090428	400.25	406.00	404.25	29.98	33.53	43.36	405.92	417.94		
20090429	407.75	422.25	421.75	41.48	35.44	54.87	406.47	418.11		
20090430	415.75	427.75	423.25	62.25	44.57	55.70	408.28	417.51		
20090501	423.50	434.50	433.25	84.45	62.73	60.87	412.11	417.80		
20090504	420.75	432.00	425.50	87.82	78.17	55.47	414.56	417.40		
20090505	417.00	427.00	425.00	85.04	85.77	55.13	416.97	416.90		
20090506	423.00	428.25	426.75	80.11	84.32	56.14	418.67	416.43		
20090507	428.00	438.50	431.00	81.72	82.29	58.59	421.36	416.60		
20090508	435.00	440.00	439.75	88.73	83.52	63.15	425.61	417.17		
20090511	436.50	440.50	440.25	94.42	88.29	63.39	429.61	418.05		
20090512	446.50	450.00	448.00	98.39	93.84	67.09	432.53	419.42		
20090513	442.00	454.00	447.25	94.70	95.83	66.39	435.19	420.49		
20090514	445.25	450.00	449.25	92.16	95.08	67.37	436.97	422.11		
20090515	437.00	451.25	438.50	83.78	90.21	57.67	438.42	423.14		
20090518	433.00	446.00	442.00	79.01	84.98	59.71	440.31	424.81		
20090519	443.00	449.50	447.00	75.64	79.48	62.48	442.56	427.11		
20090520	445.00	456.00	447.25	77.77	77.47	62.62	444.36	429.19		
20090521	439.00	449.00	445.50	77.45	76.95	60.92	445.00	431.20		
20090522	448.50	455.75	452.00	80.13	78.45	64.74	446.31	433.13		
20090526	445.00	455.00	450.25	81.80	79.79	62.96	446.56	435.20		
20090527	448.00	455.75	449.75	83.33	81.75	62.43	446.83	437.50		
20090528	446.75	457.50	452.25	79.61	81.58	64.05	447.17	439.79		
20090529	455.00	460.00	459.25	84.49	82.48	68.21	449.47	441.57		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20090601	463.75	469.00	469.25	92.16	85.42	73.00	452.50	443.76	469.25	
20090602	465.00	473.00	472.75	99.10	91.92	74.46	455.36	445.64	472.75	
20090603	454.00	468.75	455.00	85.02	92.09	57.54	456.22	447.05		
20090604	459.00	471.25	471.50	83.54	89.22	65.41	459.11	449.26		
20090605	464.00	470.00	467.50	79.17	82.58	62.39	460.83	451.20		
20090608	456.50	464.00	458.00	79.46	80.72	55.81	461.69	452.49		
20090609	462.50	468.00	466.25	74.09	77.57	59.78	463.53	453.75		
20090610	457.00	471.50	458.00	63.97	72.51	54.50	464.17	454.60		
20090611	462.00	469.25	463.25	67.07	68.38	57.10	464.61	455.32		
20090612	443.25	458.75	447.75	45.40	58.81	48.34	462.22	455.35		
20090615	427.25	438.00	427.75	27.13	46.53	39.84	457.22	454.32		
20090616	424.25	432.50	425.25	6.09	26.21	38.92	453.92	453.69		
20090617	419.25	429.75	428.75	6.94	13.39	40.98	449.17	453.06		
20090618	422.50	428.00	423.75	9.37	7.47	38.96	444.31	451.95		
20090619	418.50	427.75	419.50	9.29	8.53	37.28	440.03	450.63		
20090622	400.50	408.50	405.50	5.75	8.14	32.33	433.28	448.73		
20090623	401.00	409.75	409.00	6.95	7.33	34.67	427.83	446.68		
20090624	401.50	411.00	407.25	9.51	7.40	34.03	421.61	444.63		
20090625	400.50	408.25	401.50	7.63	8.03	31.97	416.47	442.33		
20090626	399.00	406.25	404.25	6.05	7.73	34.03	413.86	440.05		
20090629	396.00	403.00	397.25	3.44	5.71	31.42	410.75	437.10		
20090630	367.25	375.00	367.25	2.97	4.15	23.21	403.92	432.24		367.25
20090701	362.00	373.50	369.25	3.05	3.15	24.63	397.86	427.31		369.25
20090702	357.00	364.00	357.50	2.70	2.91	22.06	390.97	422.67		357.50
20090706	343.75	349.75	344.25	2.89	2.88	19.58	384.17	416.61		344.25
20090707	335.00	350.25	335.75	0.66	2.08	18.16	376.03	410.33		335.75
20090708	332.00	340.25	334.25	1.23	1.59	17.92	367.92	404.44		334.25
20090709	335.75	341.00	340.00	3.83	1.91	22.26	361.08	398.43		340.00
20090710	328.50	338.50	338.00	7.40	4.16	21.82	353.72	392.71		338.00
20090713	329.50	339.75	339.50	11.07	7.43	23.03	347.31	386.82		339.50
20090714	339.50	346.00	345.50	15.15	11.21	27.83	344.89	381.95		345.50
20090715	336.00	349.25	337.50	15.07	13.76	25.54	341.36	377.65		337.50
20090716	324.75	334.75	325.25	10.83	13.69	22.50	337.78	372.89		325.25
20090717	324.75	332.00	331.50	6.84	10.92	27.26	336.36	368.26		331.50
20090720	328.50	334.00	333.75	9.05	8.91	28.96	336.14	363.98		333.75
20090721	320.50	332.50	322.00	9.79	8.56	25.60	334.78	359.33		322.00
20090722	314.75	320.75	319.25	9.96	9.60	24.88	332.47	355.23		319.25
20090723	326.75	339.50	338.75	26.52	15.42	38.26	332.56	351.88		
20090724	325.50	338.50	327.25	37.32	24.60	34.37	331.19	348.07		
20090727	325.00	334.50	333.75	52.63	38.82	38.19	329.89	344.85		
20090728	329.75	336.00	329.75	44.59	44.85	36.77	329.03	341.30		
20090729	322.75	328.25	328.00	45.65	47.62	36.14	329.33	338.00		
20090730	335.00	344.00	342.25	53.86	48.03	44.51	330.53	336.81		
20090731	339.50	350.00	349.50	72.23	57.25	48.23	332.28	335.87		
20090803	360.50	375.25	369.00	89.32	71.81	56.65	337.50	336.42		
20090804	364.00	372.00	365.75	90.85	84.13	55.04	342.67	337.44		
20090805	349.00	367.50	357.00	81.27	87.15	50.86	344.69	338.45		
20090806	339.00	351.25	340.25	65.43	79.18	43.97	346.14	338.74		
20090807	326.00	340.00	326.50	43.80	63.50	39.27	345.33	338.10		
20090810	327.50	336.25	330.50	29.20	46.14	41.24	345.42	337.74		
20090811	328.50	333.25	331.00	20.39	31.13	41.50	345.75	337.33		
20090812	322.00	339.00	336.25	22.84	24.14	44.24	345.08	336.89		
20090813	331.25	342.50	332.00	20.42	21.21	42.50	343.14	336.63		
20090814	325.75	329.25	327.75	18.78	20.68	40.78	338.56	336.75		
20090817	311.75	322.50	321.75	15.11	18.10	38.41	333.67	336.29		
20090818	318.50	323.00	322.50	14.49	16.13	38.89	329.83	335.75		
20090819	319.50	329.00	327.50	19.16	16.25	42.11	328.42	336.01		
20090820	322.75	328.25	324.00	20.34	18.00	40.50	328.14	336.24		
20090821	322.00	332.00	326.25	22.72	20.74	42.04	327.67	335.64		
20090824	329.50	335.50	335.50	28.65	23.90	47.97	328.17	336.04		
20090825	322.75	337.50	326.75	34.88	28.75	43.44	327.11	335.70		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20090826	323.75	329.25	326.25	42.58	35.37	43.19	326.47	335.54		
20090827	321.00	330.25	329.25	47.35	41.60	45.23	326.64	335.60		
20090828	324.50	332.00	329.00	53.39	47.77	45.09	327.44	334.96		
20090831	320.00	330.50	329.75	57.18	52.64	45.65	328.25	334.02		
20090901	316.75	326.25	319.25	46.34	52.30	39.52	327.33	331.65		
20090902	315.50	319.50	319.25	37.35	46.96	39.52	326.81	329.44		
20090903	311.50	320.00	315.75	23.29	35.66	37.57	325.64	327.48		
20090904	306.00	312.50	306.25	15.42	25.35	32.83	322.39	325.86		
20090908	305.25	310.50	307.50	8.04	15.58	34.01	320.25	324.95		
20090909	306.00	312.00	309.75	7.24	10.23	36.18	318.42	323.96		
20090910	309.50	318.50	315.25	17.31	10.86	41.27	316.86	323.21		
20090911	309.00	320.25	319.75	29.97	18.18	45.13	315.83	322.43		
20090914	315.50	320.00	317.75	38.24	28.51	43.75	314.50	321.75		
20090915	322.50	347.75	346.50	60.26	42.83	61.78	317.53	322.64		
20090916	325.00	342.00	336.25	69.59	56.03	55.01	319.42	323.33		
20090917	323.00	331.50	329.00	75.29	68.38	50.77	320.89	323.64		
20090918	316.75	327.25	318.00	52.94	65.94	45.10	322.19	323.19		
20090921	310.50	316.50	316.00	37.06	55.10	44.13	323.14	322.81		
20090922	316.75	326.00	325.75	34.51	41.50	49.78	324.92	322.79		
20090923	319.25	335.00	330.25	44.12	38.56	52.18	326.58	322.54		
20090924	323.00	337.75	336.50	60.20	46.27	55.38	328.44	323.00		
20090925	328.75	340.50	334.00	66.67	56.99	53.83	330.25	323.37		
20090928	332.25	339.50	338.75	73.21	66.69	56.33	329.39	323.82		
20090929	336.50	346.25	341.00	76.22	72.03	57.50	329.92	324.39		
20090930	335.50	344.25	344.00	83.78	77.74	59.08	331.58	325.07		
20091001	337.50	346.00	340.50	84.48	81.50	56.44	334.08	326.08		
20091002	331.75	340.25	333.50	77.53	81.93	51.50	336.03	326.76		
20091005	330.50	350.00	341.50	73.59	78.53	56.22	337.78	327.99		
20091006	355.50	369.75	358.25	73.61	74.91	64.10	340.89	330.46		
20091007	354.25	364.00	359.75	80.73	75.97	64.71	343.47	332.95		
20091008	362.00	370.00	364.00	84.54	79.63	66.46	346.81	335.54		
20091009	359.00	373.00	362.25	84.64	83.31	65.03	349.42	337.77		
20091012	371.50	383.50	381.25	89.10	86.10	72.05	353.89	340.70	381.25	
20091013	375.00	386.25	381.75	90.09	87.94	72.21	358.08	343.75	381.75	
20091014	377.75	388.50	383.00	93.39	90.86	72.62	362.81	345.49	383.00	
20091015	369.00	378.00	373.00	85.65	89.71	64.31	367.19	347.24		
20091016	368.75	375.00	372.00	78.54	85.86	63.53	370.58	349.29		
20091019	375.50	387.50	386.25	80.32	81.50	69.27	373.69	352.54		
20091020	379.50	387.50	384.50	86.93	81.93	67.86	376.44	355.80		
20091021	387.00	403.50	398.25	94.01	87.08	72.59	380.25	359.25	398.25	
20091022	395.25	405.00	403.50	94.63	91.86	74.15	384.83	362.74	403.50	
20091023	395.00	413.00	397.75	88.28	92.31	69.48	386.67	365.65		
20091026	376.75	400.00	378.00	70.82	84.58	56.34	386.25	367.75		
20091027	369.50	378.50	370.75	45.41	68.17	52.42	384.89	369.27		
20091028	365.25	372.00	369.00	26.90	47.71	51.49	384.44	370.61		
20091029	372.50	381.75	379.50	23.37	31.89	56.48	385.28	372.30		
20091030	364.00	374.00	366.00	17.48	22.59	49.43	383.03	373.51		
20091102	366.75	383.50	382.25	23.72	21.53	56.47	382.78	375.83		
20091103	375.50	396.25	390.00	31.46	24.22	59.38	381.86	378.14		
20091104	383.50	398.75	384.00	43.71	32.96	56.25	379.69	379.37		
20091105	376.25	386.00	376.50	39.80	38.32	52.52	377.33	380.17		
20091106	366.00	372.50	367.00	24.15	35.88	48.17	376.11	380.31		
20091109	369.25	388.00	386.00	25.51	29.82	56.02	377.81	381.44		
20091110	380.50	397.00	394.50	37.76	29.14	59.01	380.64	382.07		
20091111	392.00	402.50	394.00	56.12	39.80	58.76	382.25	382.65		
20091112	385.00	398.00	390.50	64.10	52.66	56.92	384.97	383.01		
20091113	385.75	394.00	390.50	66.30	62.17	56.92	385.89	383.85		
20091116	396.25	403.00	402.25	78.58	69.66	61.60	387.25	385.29		
20091117	397.00	404.00	402.00	87.30	77.39	61.45	389.25	386.04		
20091118	397.75	409.00	398.00	89.54	85.14	58.93	391.64	386.68		
20091119	390.50	400.00	395.00	79.33	85.39	57.03	394.75	386.52		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20091120	389.00	394.75	391.00	67.05	78.64	54.52	395.31	385.93		
20091123	385.25	402.75	387.25	58.33	68.24	52.20	394.50	385.43		
20091124	375.00	383.00	376.00	43.60	56.33	45.89	392.50	385.33		
20091125	381.50	393.50	392.00	44.38	48.77	54.34	392.67	386.35		
20091127	383.00	398.25	397.25	51.39	46.46	56.73	393.42	387.69		
20091130	392.25	405.00	402.75	70.84	55.54	59.15	393.47	388.80		
20091201	397.50	405.50	399.75	74.95	65.73	57.27	393.22	390.40		
20091202	390.00	398.00	391.75	67.89	71.23	52.49	392.53	390.86		
20091203	385.00	391.50	385.25	50.74	64.53	48.92	391.44	390.63		
20091204	373.50	384.75	373.75	26.71	48.44	43.30	389.53	390.14		
20091207	367.50	374.25	368.75	11.29	29.58	41.09	387.47	389.77		
20091208	368.00	371.00	369.50	2.85	13.61	41.57	386.75	389.89		
20091209	364.00	372.50	368.00	5.82	6.65	40.85	384.08	389.04		
20081209	311.00	320.00	312.25	17.38	9.92	33.12	326.56	351.35		
20081210	318.00	328.50	326.75	31.57	19.55	39.71	323.53	348.64		
20081211	325.00	342.00	338.00	45.70	31.55	44.29	322.25	346.92		
20081212	328.00	364.00	359.50	69.2	48.82	51.83	325.22	346.44		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

Table 9.2 Application of methodology on December 2009 CBOT corn futures contract

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-09	2009/01/06	$4.71	Buy	Put	50.90%	$4.80	-$0.93	$3.87
Dec-09	2009/01/06	$4.71	Buy	Put	50.90%	$3.80	-$0.42	$3.45
Dec-09	2009/01/06	$4.71	Sell	Call	50.90%	$5.60	$0.59	$4.04
Dec-09	2009/06/30	$3.67	Sell	Put	41.40%	$3.80	$0.45	$4.49
Dec-09	2009/06/30	$3.67	Sell	Put	41.40%	$3.00	$0.11	$4.60
Dec-09	2009/07/16	$3.25	Buy	Call	46.30%	$5.60	-$0.01	$4.59
Dec-09	2009/10/12	$3.81	Buy	Put	43.00%	$3.00	-$0.01	$4.58

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-09	2009/04/30	$4.33	Buy	Call	16.60%	$4.40	$0.18	$4.58
Dec-09	2009/04/30	$4.33	Buy	Call	16.60%	$5.20	$0.02	$4.60
Dec-09	2009/04/30	$4.33	Buy	Put	16.60%	$3.40	$0.00	$4.60
Dec-09	2009/06/01	$4.69	Sell	Call	41.40%	$5.20	-$0.34	$4.26
Dec-09	2009/06/01	$4.69	Sell	Call	41.40%	$5.60	-$0.24	$4.02
Dec-09	2009/06/30	$3.67	Buy	Call	41.40%	$5.60	$0.03	$4.05
Dec-09	2009/06/30	$3.67	Sell	Call	41.40%	$4.40	-$0.15	
Dec-09	2009/06/30	$3.67	Buy	Call	41.40%	$3.60	$0.41	$3.51
Dec-09	2009/06/30	$3.67	Sell	Put	41.40%	$3.40	-$0.24	$3.27
Dec-09	2009/07/21	$3.22	Sell	Call	46.30%	$3.60	-$0.20	
Dec-09	2009/07/21	$3.22	Buy	Call	46.30%	$3.20	$0.35	$3.02

9.4 PERFORMANCE MEASUREMENT BY MEANS OF BENCHMARKING

The financial performance of the proposed price risk management methodology needs to be compared to the returns offered by the market or alternative trading structures in order to justify its application. Positive comparisons will enhance the feasibility, credibility and perceived success of the proposed methodology. Therefore, the decision on the calculation of the appropriate returns against which the performance of the methodology will be compared remains a significant consideration in the evaluation of the strategy.

This section will aim to define and explain the concept of performance comparisons. Once completed, the historical returns on the chosen standard of measurement will be calculated for comparison purposes in the next section. Consequently, the success of the methodology will hinge on the returns achieved through the application of the methodology versus the returns from the chosen standard of measurement.

9.4.1 Benchmarking

Performance comparisons, or more generally referred to as benchmarking, is an evolving concept, which has seen some major developments in the previous century towards more sophisticated forms (Watson 1993). Over the years, benchmarking has established itself as a valuable business tool, which is used with the objective to improve organisations' performance and competitiveness in the financial sector. The central essence of benchmarking is therefore to improve processes and strategies (Ahmed & Rafiq 1998). It can be applied successfully and effectively by small to large businesses, semi-public sectors and the general public (Ball 2000).

According to Brigham et al. (1999), benchmarking can be defined as a process of comparisons whereby the variable returns achieved by one business or strategy are compared to those of another. Stated differently, benchmarking compares the performance actually achieved to returns that could have been obtained through the application of another appropriate strategy. This is consistent with the definition of Bhutta and Huq (1999) who state that benchmarking is first and foremost a tool for improvement which is achieved by means of the process of comparisons against other organisations or strategies recognised as being superior within the specific field of interest. Lucertini, Nicolo

and Telmon (1995) define benchmarking as an approach used for evaluating and improving performance by means of comparisons.

In practice, two basic types of benchmarks or suitable standards of measurement can be identified, namely peer-group benchmarking and external benchmarking.

a) Peer-group benchmarking

This type of benchmarking entails the comparison of returns achieved by a business or strategy to the performance of alternative businesses or strategies, either individually or on average (Irwin et al. 2006). While peer-group benchmarking provides interesting information on the ranking of alternative strategies, it is unable to determine whether a specific risk management model is superior or inferior in an absolute economic sense.

b) External benchmarking

External benchmarking involves the comparison of the performance of a particular risk management strategy or business versus the returns offered by the passive market. The passive market encompasses an average price over a series of commodities or time periods which is achieved without engaging in any form of active management. As such, external benchmarking is based upon the efficient market hypothesis (Irwin et al. 2006).

As discussed in Chapter 5, the efficient market theory entails that markets are rational and all-knowing. Competition between participants in the marketplace will immediately eliminate all possible arbitrage opportunities available by way of the exploitation thereof (Fama 1970; Madura 2000; Hull 2002). As a result, no trading strategy can theoretically outperform the returns offered by the market on a constant basis and this is the platform upon which the returns offered by the market are regularly used as benchmark.

9.4.2 Steps in the benchmarking-process

Researchers intending to make use of benchmarking need to follow a simple three-step process in order to link actual results to desired returns (Lucertini et al. 1995). This is illustrated in Figure 9.1.

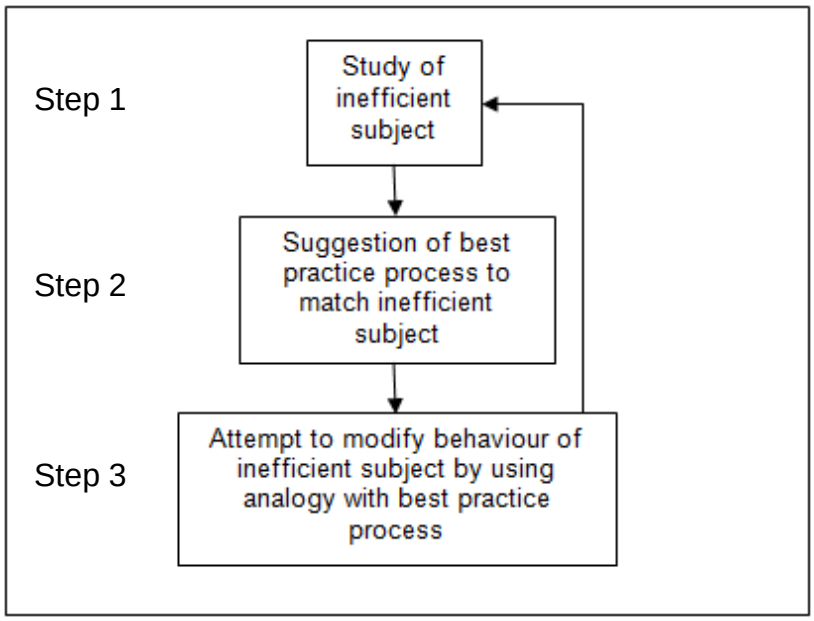

Figure 9.1 The benchmarking-process

Source: Lucertini et al. (1995)

Step 1

Identify the subject to be analysed and provide a detailed and comprehensive explanation as to the specific inefficiencies (Lucertini et al. 1995).

For the purposes of this study, the inefficient subject related to the inability of stakeholders in the corn futures market to mitigate price risk successfully and effectively and to exploit market movement.

Step 2

Suggest a best practice process (benchmark) with the objective of matching the two processes with comparable analogies (Lucertini et al. 1995).

The selection of the appropriate benchmark will be discussed in paragraph 9.4.3.

Step 3

Once the best practice process has been identified, attempt to modify the interconnections, structures or behaviour of the inefficient process in a manner that will result in the processes converging to one another (Lucertini et al. 1995).

The proposed price risk management methodology attempted to modify current trading strategies with the objective of ultimately providing returns superior to the best practice process (benchmark) as discussed in step 2.

The concept of benchmarking therefore involves the decision on the best practice process, or more appropriately referred to as the calculation of a suitable standard of measurement, against which performance is measured. These comparisons and measurements ultimately serve as an objective standard of performance (Irwin et al. 2006).

9.4.3 Selection of appropriate benchmark

In selecting the most appropriate benchmark for the particular study, it is important to take into consideration the standard measurement of choice as indicated by respondents by means of the assessment instrument. In addition, focus should be placed on the industry standards with regard to performance assessment as well as the benchmark used in previous studies on the same topic.

9.4.3.1 Respondents' choice of benchmark

In Chapter 8, emphasis was placed on determining the most suitable standard of performance measurement as indicated by respondents using the assessment instrument. The feedback clearly suggested that performance equal to or superior to the average market price over the period under consideration remains the preferred benchmark used by producers, processors and speculators for comparison purposes.

9.4.3.2 Industry standards on performance assessment

A popular standard of performance measurement in financial markets is to compare investment returns against external benchmarks. It is therefore commonplace for fund managers to compare the returns of an actively managed mutual fund to the market index (Malkiel 2005).

The market index refers to a passive average of similar or matching stocks, such as the SATRIX 40 and ALSI in South Africa. International indexes (often referred to as benchmarks) include the Dow Jones Industrials Index, S&P 500 Index and Nasdaq 100 Index (Hull 2002).

9.4.3.3 Benchmark used in previous studies

The most authoritative research on the subject was completed by Irwin et al. (2006) for the AgMAS Project Research Report at the University of Illinois. The research project focused on the performance evaluation of trading recommendations by market advisory services

over a pre-determined period. External benchmarks, based upon the efficient market hypothesis, were applied in order to evaluate the realised returns.

In the context of the AgMAS study, the external market benchmark measured the average price offered by the futures exchange over the marketing window. The average price is calculated as a naïve strategy of marketing equal amounts of grain each day over the marketing window period (Irwin et al. 2006). The value of a trading strategy/recommendation is consequently calculated as the difference in returns achieved by the trading strategy/recommendation versus the average price. The theory of efficient markets predicts that this difference will, on average, equal zero.

9.4.3.4 Appropriate benchmark for study

In deciding on the most appropriate benchmark in order to evaluate the performance of the proposed price risk management methodology, it is important to consider the desirable properties to which a benchmark should adhere. Good, Irwin and Jackson (1998) identify the following prerequisites:

- a benchmark should be easy to calculate;
- a benchmark should be simple to understand, and should represent a financial return which can be achieved by any trader through implementation of the specific strategy; and
- the benchmark return should be directly comparable to the returns achieved by the methodology.

For the purposes of this study, the benchmark that will be used to evaluate the performance of the proposed methodology is the average market price for the December corn futures contract over the period 1 January to 30 November. The reasons for this decision are as follows:

- The objective of the study was to contest the efficient market hypothesis, otherwise known as the average market return.
- The average market price complies with the prerequisites of a benchmark as set forth by Good et al. (1998).
- The simple average price has previously been used by an authoritative study on this subject as an appropriate benchmark (Irwin et al. 2006).

- Respondents on the questionnaire overwhelmingly indicated the average price as the most appropriate measure of performance success.
- The December corn futures contract represents the most liquid contract month as it is the main delivery month for corn as traded on the CBOT.
- The average price is calculated up to 30 November, given the risk of physical delivery against long futures positions in the delivery month.

9.4.4 Calculating the market benchmark 2000–2009

As discussed in paragraph 9.4.3.3, the average market price to be used as benchmark can be calculated as follows:

AMP = (n1+n2+n3……)/TD
where
AMP = average market price
n = daily December closing price of corn
TD = number of December corn trading days
(See Appendix I for comprehensive details of the daily December corn closing prices.)

By applying this formula to the December corn futures contract from 2000 to 2009, the average market price for the individual marketing years is calculated and summarised in Figure 9.2.

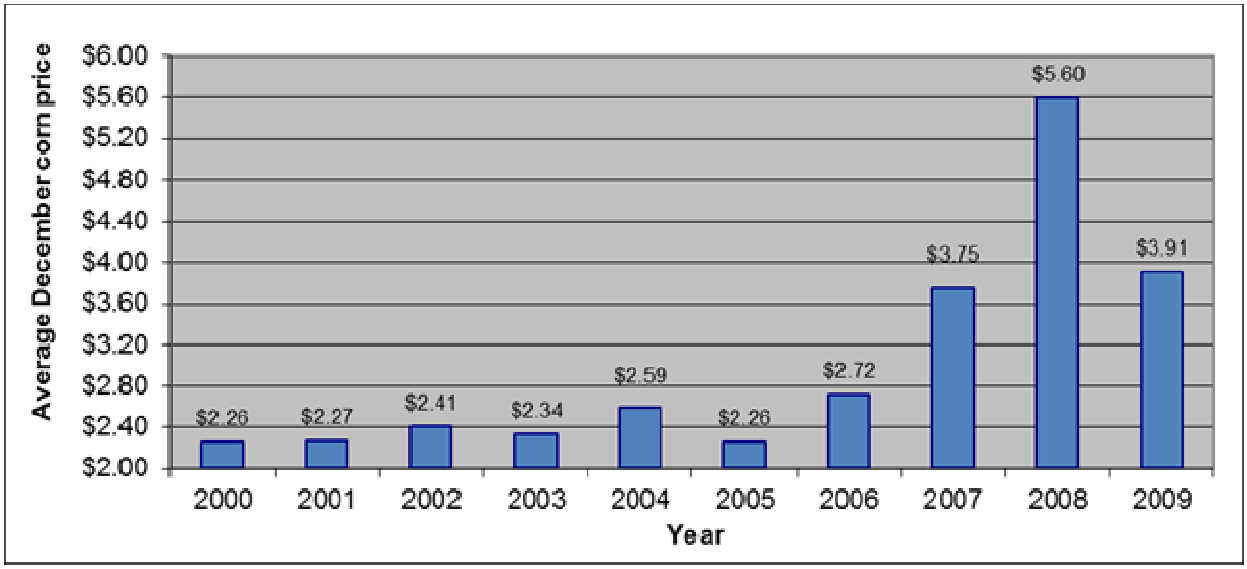

Figure 9.2 Average December corn futures price 2000–2009

Source: CME (2012)

From the illustration, it is evident that price volatility and therefore market movement increased substantially from 2005 onwards, with the 2008 average market price 2.48 times higher than the 2005 average market price.

9.5 RETURNS ACHIEVED VERSUS BENCHMARK 2000–2009

In order for the proposed price risk management methodology to be accepted and therefore to challenge and contest the notion of efficient markets effectively, the price risk management methodology needs to achieve returns superior to that of the chosen benchmark, i.e. the average market price, consistently. Table 9.3 reflects a summary of the net returns (after adjustment for option costs) achieved by the methodology versus the average market price. The relevant calculations are presented in Appendix IV.

Table 9.3 Methodology returns vs. benchmark 2000–2009

Year	Average market price	Long position	Short position	Speculative profit
2000	$2.26	$2.18	$2.30	$0.12
2001	$2.27	$2.08	$2.30	$0.22
2002	$2.41	$2.28	$2.56	$0.28
2003	$2.34	$2.21	$2.34	$0.13
2004	$2.59	$2.50	$2.70	$0.20
2005	$2.26	$1.92	$2.28	$0.36
2006	$2.72	$2.34	$3.13	$0.79
2007	$3.75	$3.64	$3.78	$0.14
2008	$5.60	$4.09	$5.97	$1.88
2009	$3.91	$3.02	$4.58	$1.56

The annual long position price level obtained through application of the derivative price risk management methodology versus the benchmark average market price is depicted graphically in Figure 9.3. As is evident from the graph, the methodology consistently achieved a long position at a price level lower than the comparative benchmark after adjusting for relevant option costs. As a result, the conclusion can be reached that the methodology has a high degree of price forecastability through which market movement can be exploited.

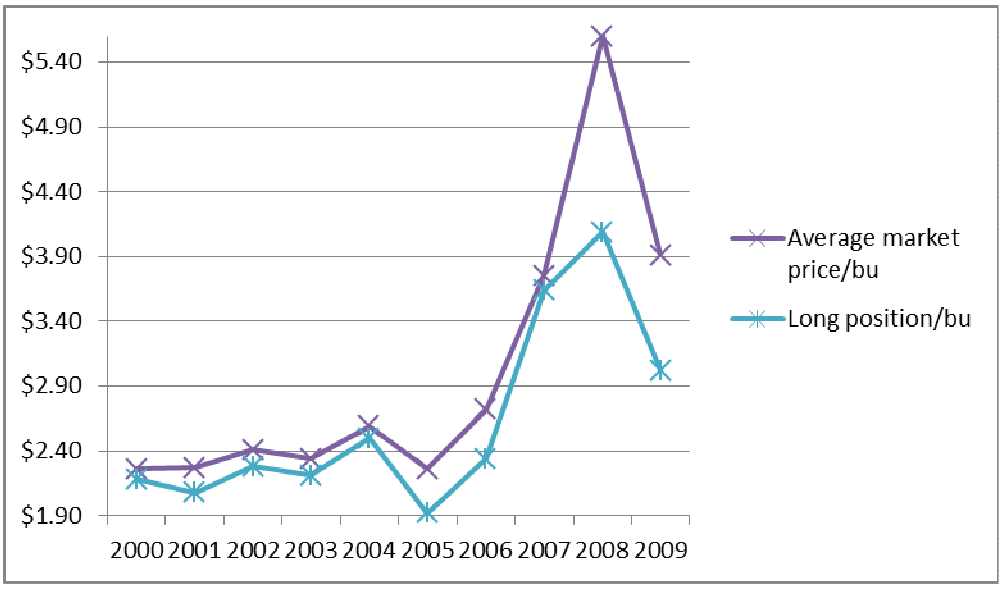

Figure 9.3 Performance evaluation of methodology: Long position vs. benchmark 2000–2009

Figure 9.4 illustrates the annual short position price level obtained through application of the derivative price risk management methodology versus the benchmark average market price. The graph clearly indicates that the methodology was consistently able to achieve a short position at a price level superior to that of the comparative benchmark average

market price, even after subtracting the option costs from the returns achieved. Therefore, the conclusion are made that the methodology has a high degree of price forecastability by which market movement can be exploited.

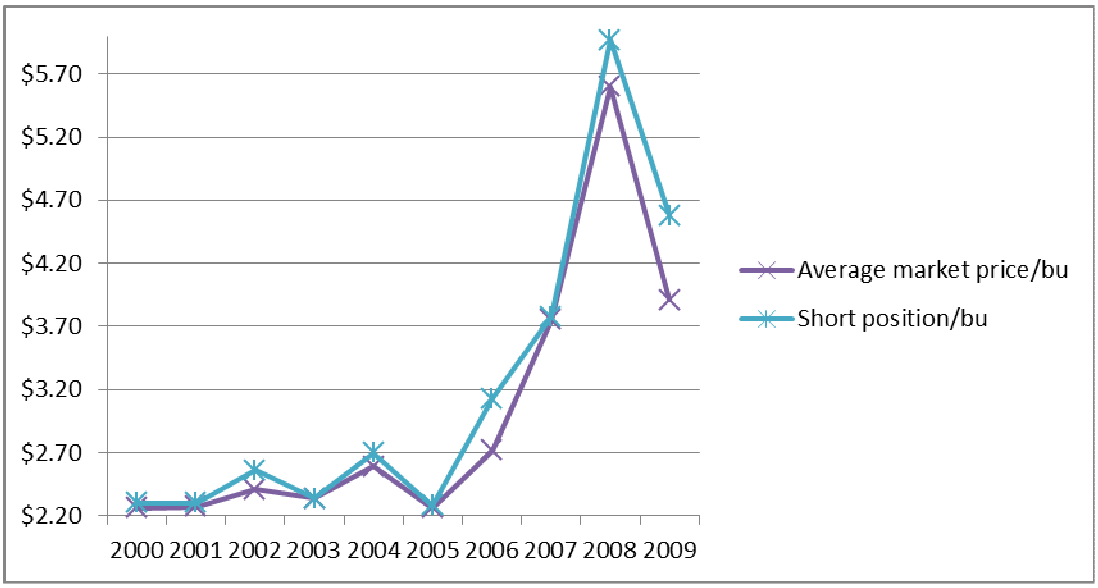

Figure 9.4 Performance evaluation of methodology: Short position vs. benchmark 2000–2009

Figure 9.5 graphically reflects a summary of the methodology returns as presented in Table 9.3. It is evident from the illustration that the benchmark average market price is outperformed on an annual basis by both the long position price level, as well as the short position price level.

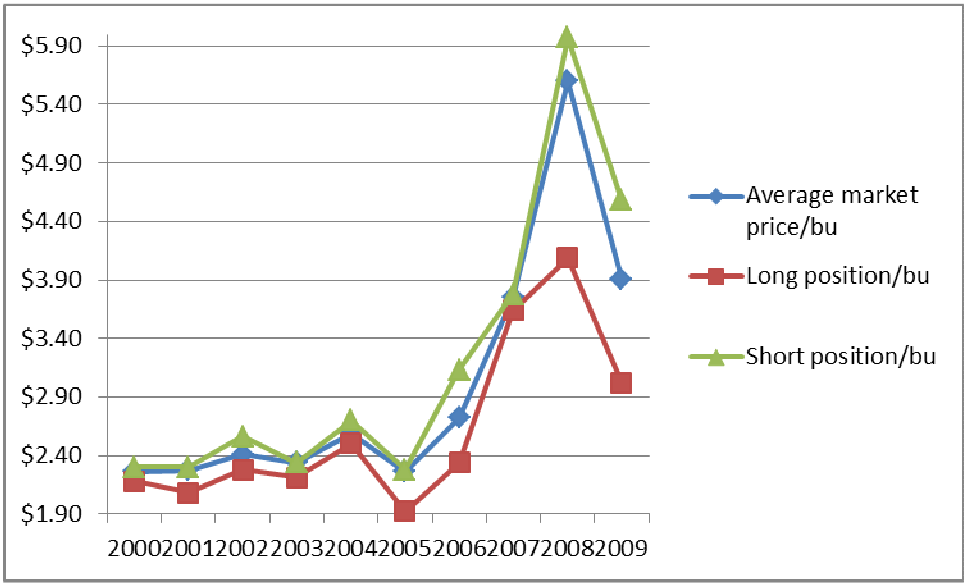

Figure 9.5 Summary of financial performance of methodology vs. benchmark 2000–2009

If the conclusion holds that the methodology is able to realise a long position price level lower than that of the comparative benchmark as well as a short position price level higher than that of the comparative benchmark, it is obvious that speculative profits should be made when simultaneously engaging in a long- and short position by using exactly the same methodology. This is depicted in Figure 9.6, which confirms an annual short position in excess of the annual long position on a consistent basis. Figure 9.7 indicates the net speculative profit realised on an annual basis after adjusting for option costs.

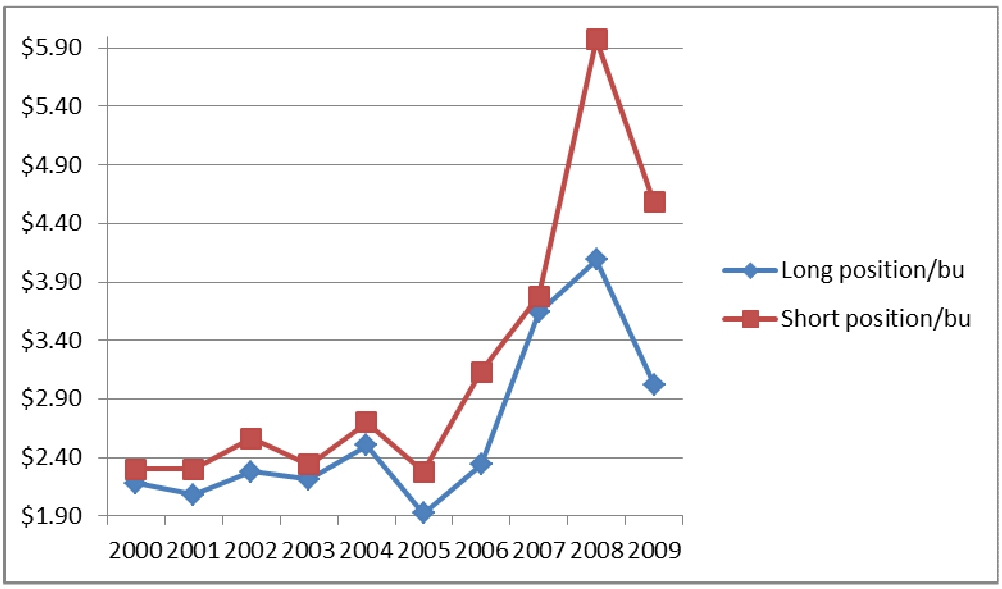

Figure 9.6 Summary of long position price level vs. short position price level 2000–2009

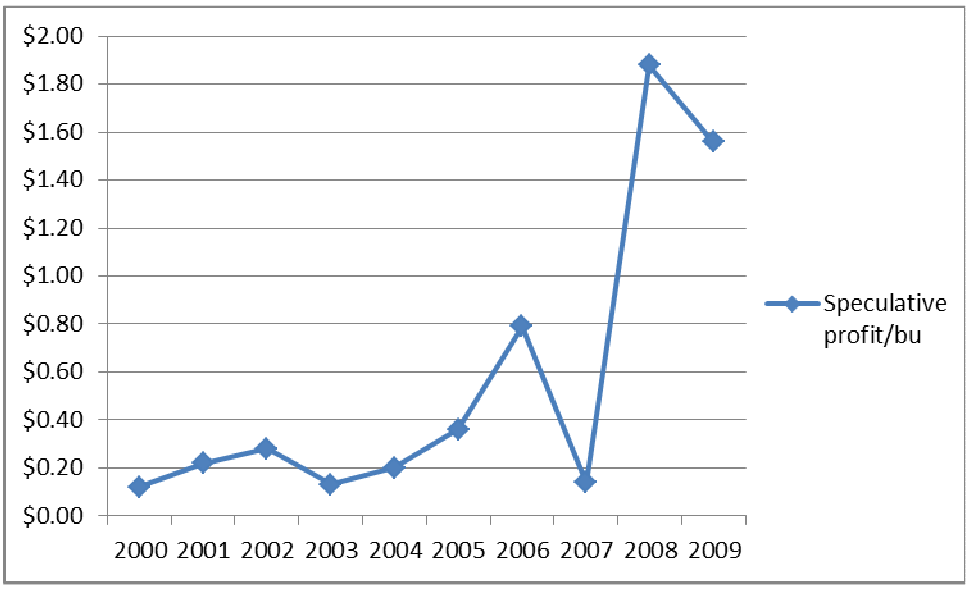

Figure 9.7 Speculative profits achieved by means of application of methodology 2000–2009

9.6 APPLICATION OF METHODOLOGY ON RANDOM DATA SETS

In order to obtain scientific credibility and to prevent the possibility of data snooping or bias when applying the derivative price risk management methodology on historical data, a number of data sets are randomly drawn after which the methodology is applied in terms of the data obtained. A successful application will further enhance the feasibility of the methodology and provide additional support for ultimately accepting the methodology in contesting the efficient market hypothesis.

9.6.1 Calculation of random data sets

The price data are gathered by application of the random function (in Microsoft Excel) in terms of randomly chosen data:

- The base price used on the first date of trading equals $3.00 per bushel.
- In order to calculate the technical oscillators, a daily high, daily low and daily closing price needs to be obtained.
- The daily close is calculated firstly by assigning a random price movement of between -$0.30/bu and +$0.30/bu (limit down to limit up) on the closing price of the previous day.
- The daily low is calculated by randomly assigning a trading range of between -$0.30/bu and $0.00/bu on the daily closing price already obtained.
- For the calculation of the daily high, a randomly selected value of between $0.00/bu and +$0.30/bu is applied in terms of the daily closing price already obtained.
- Once these sets of data have been summarised, the methodology is applied in terms of the random data in order to evaluate the effectiveness of the price risk management methodology in contesting the efficient market hypothesis.

The data sets obtained as well as the calculation of the relevant technical oscillators are presented in Appendix V.

9.6.2 Returns achieved through application of methodology on random data sets

Table 9.4 reflects a summary of the net returns (after adjustment for option costs) achieved by the methodology versus the average market price as depicted by the series of random data sets. The relevant calculations are presented in Appendix VI.

Table 9.4 Methodology returns versus benchmark on random data sets

Sample	Average market price	Long position	Short position	Speculative profit
1	$3.21	$2.35	$4.23	$1.88
2	$2.20	$0.70	$3.14	$2.44
3	$4.40	$3.09	$4.51	$1.42
4	$2.52	$0.45	$2.65	$2.20
5	$3.04	$0.48	$3.43	$2.95
6	$3.45	$3.19	$4.45	$1.26
7	$2.87	$0.91	$4.85	$3.94
8	$3.89	$3.41	$3.90	$0.49
9	$2.59	$2.58	$2.90	$0.32
10	$2.65	$1.15	$2.65	$1.50

From these results, it is evident that the proposed methodology was able to outperform the relevant benchmark as presented by the randomly chosen independent data. It is therefore suggested that the methodology is indeed capable of successfully contesting the notion of efficient markets.

Of interest though is the impact of a trendless market on the application of the methodology. Since the randomly chosen data sets are involuntary in nature, they do not adhere to a price trend as observed over the period 2000–2009 in terms of which the methodology is applied. During these ten years, a total of 20 observations were made (consisting of long positions and short positions) of which only three required delta trading in order to offset a short position in an option. The 20 observations made in the ten randomly chosen data sets required delta trading in eleven instances. It can therefore be concluded that trendless markets require a trader to delta out short options positions in comparison to trending markets more frequently.

9.7 SUMMARY AND CONCLUSIONS

This chapter provided a background on the reasoning behind the development of the proposed methodology with reference to findings from earlier chapters.

In order to justify the application of the proposed price risk management methodology, the returns achieved by means of its application need to be compared against those offered by a suitable standard of measurement. This process is referred to as benchmarking and it can be classified as either peer-group benchmarking or external benchmarking. While

peer-group benchmarking compares returns achieved by a strategy to the performance of alternative strategies, external benchmarking focuses on the comparison of performance against the returns offered by the passive market.

Based upon respondents' choice of benchmark as indicated in the assessment instrument, as well as the industry standard in performance assessment and previous studies on this subject, the average market price is used as external benchmark in the evaluation of the methodology returns. The superior returns achieved by the methodology against historical price data as well as a series of randomly selected data sets confirms the ability of the methodology to contest the notion of the efficient market hypothesis consistently.

The next chapter will conclude the study and provide recommendations on possible further investigations into the subject.

CHAPTER 10
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

10.1 INTRODUCTION

This research project focused on identifying the notion of the efficient market hypothesis and testing the validity of the hypothesis against previous literature on the subject. Through an analysis of historical trading data a price risk management methodology was developed with the objective of contesting the view that markets are all-knowing and therefore cannot be outperformed consistently over a period of time. In total, 25 institutions actively trading on the corn futures market were investigated. This sample was chosen by way of a purposive, non-probability sampling technique. The chosen institutions were required to complete a research questionnaire consisting of questions relating to their financial exposure to market movement and the trading strategies implemented, as well as the success by which corn price variability and volatility are mitigated through their price-risk management strategies.

In response to the feedback received by the sample population, a derivative price risk management methodology was proposed which exploits market trends by means of a technical analysis strategy. The methodology is applied to historical market prices, in addition to sets of randomly chosen price data which are drawn to enhance the feasibility and credibility of the study. The returns achieved by the methodology are subsequently compared to those of the benchmark returns as determined by market participants in the population sample and in previous studies on the subject.

The aim of the preceding chapters was to discuss a specific component of the study using a logical sequence. These chapters are summarised as follows:

- Chapter 1

Background and problem statement

- Chapter 2

The futures market

- Chapter 3

Volatility of corn futures prices

- Chapter 4

Price risk management performance of market participants

- Chapter 5

The efficient market hypothesis

- Chapter 6

Technical analysis as price forecaster

- Chapter 7

Price and volatility trends

- Chapter 8

Research design and methodology

- Chapter 9

Empirical research findings and performance measurement

While the intention of the methodology was to provide accurate price forecasts on corn market movements consistently, the logic pertaining to the strategy was deemed simple enough to be applied to alternative markets in predicting future price movements. This chapter will focus on reaching a conclusion in order to answer the problem statement, as well as on providing recommendations for further research on this topic.

10.2 SUMMARY OF RESEARCH

Trading in derivatives have been in existence for a number of centuries, and have grown increasingly important in recent years throughout the world of finance and investments. Derivatives are instruments whose prices depend on the value of the underlying asset and are traded by hedgers, speculators and arbitrageurs. It can be classified as either forward-type contracts or option-type contracts. Futures contracts and forward contracts are agreements to buy or sell assets at an agreed-upon price at a certain time in the future. Futures contracts are distinguished from forward contracts through a standardised quality, quantity, delivery period and trading location. Options contracts are financial instruments which provide the holder with the right, but not the obligation, to enter into a futures

contract and are classified as being either call options or put options. The purchase price of an option is known as the premium and can be calculated by a number of alternative mathematical models, of which the Black-Scholes model is the best known (Bodie et al. 2002). The asset price, strike price, volatility and time until maturity have the biggest impact on the option premium.

Commodities, often the asset underlying the derivative contract, are consumption assets. They are exchangeable and can satisfy human needs. Soft commodities are produced through a process which manipulates biological processes and resources. This is commonly known as agriculturally produced commodities and their prices are derived from exchange-traded futures contracts. Corn futures contract prices are determined by a number of variables, the most important of which are supply and demand of the product. Other variables include international corn prices, weather conditions and currency levels.

The volatility of a commodity underlying the derivative contract refers to the measure of the uncertainty of the price of an asset and provides traders with an estimate on the magnitude of price movement, which can be expected. Price volatility remains the least manageable factor threatening participants in the derivative market and has recently been trading well in excess of the average from the last quarter-century. It remains an essential tool in the pricing of assets and the risk management of market price movement. Agricultural commodity markets are notoriously volatile and are set to become even more vulnerable to world events as agriculture becomes more global in nature. The increase in price volatility has resulted in a heightened interest in the price risk management mechanisms brought about by derivative instruments.

In addition to the volatility of corn futures prices, the actual magnitude of price movement is a major concern to all stakeholders in the corn futures market. Research has confirmed the existence of structural price changes in the corn futures market. By analysing the historical nominal corn prices in combination with current market fundamentals, future price expectations can be generated. A characteristic of structural price changes is the exaggerated levels of volatility, which follow the transition from one period to another. It is expected that a new era of exceptionally high corn price volatility has begun, and the

prospect of large price ranges suggests that market participants may find increasingly more value in derivative instruments as a mechanism of protecting profitable price levels.

Exaggerated price volatility levels represent an economic risk to all stakeholders in the soft commodities futures market as the effectiveness by which price volatility is managed and exploited has a direct impact on the social welfare of stakeholders. The existence of vertical linkages between market levels in agricultural markets suggests that price transmission, and therefore price volatility, is transmitted directly to market participants. Limited research confirms the existence of unidirectional spill-over of price volatility between primary input prices and vertically related markets.

Producers commonly rate commodity price risk as the least manageable factor threatening the social welfare of their businesses. Processors have experienced dramatic declines in operating profits as a result of unexpected market movement, and market advisory services continually struggle to outperform the market, while speculators are looking for ways to enhance their price-forecasting ability. Ample research confirms that, while still exploiting favourable market movement, none of these market participants possesses strategies that consistently mitigate price volatility. The main reasons for the inability of traders to implement price risk management strategies successfully include a limited application of derivative instruments, capital constraints, a lack of derivative knowledge and delayed access to fundamental and technical market information.

The efficient market hypothesis is defined as being a market, which is efficient with respect to all relevant available information, search technologies and forecasting models if it is impossible to increase social welfare through economic profits earned by trading on the basis of certain signals as provided by a forecasting methodology. The efficient market hypothesis yields a number of noteworthy predictions. These include asset prices moving as random walks, the rapid discount of information in asset prices, a lack of ability to predict future returns from spot prices and a negative impact as a result of transaction costs on the eventual profitability. A vast amount of empirical research has been done on the development and analysis of financial models with the objective of generating returns superior to that offered by the market. Researchers are divided in their conclusions. A limited amount of research has been published on the forecastability of prices in the soft commodities futures market. Although empirical results indicate that grain futures markets

tend to be efficient and therefore do not allow for opportunities to obtain abnormal trading profits, price cycles are frequently observed. These may be exploited in a manner which will be in contrast with previous findings on profitability and forecastability in the corn futures market.

Technical analysis is a price-forecasting method which analyses past and current price action by using charts with the objective of obtaining information regarding future price movements. The accuracy and success of technical analysts in forecasting future price movements is a controversial and divisive subject with contrasting findings being published by researchers. The main objections against technical trading give rise to the belief that futures prices have no memory and therefore an analysis of past prices will have no effect on future price movement. In addition, academics suggest that subjectivity relating to the interpretation of charts may lead to distorted trading signals. In contrast to this, empirical studies identify technical trends in markets which do not reflect the essence of a true random walk. It has also been suggested that technical analysis, other than fundamental analysis, is not subject to false trend movements based on inaccurate market information. Research has shown that the application of non-parametric statistical techniques may identify price patterns which exhibit predictive power. Statistical and technical oscillators are indicators which determine when a market is trading in overbought or oversold conditions. They are of extreme importance in non-trending markets which trade in a narrow and limited price range. The oscillators most commonly used by analysts are the relative strength index (RSI) and stochastic indicator. While moving averages are not categorised as being oscillators, it remains an essential forecasting tool in markets where prices are in a trending phase. Oscillators can either be used individually in the forecasting of prices, or collectively as a group.

A trend can be observed by analysing past prices and is defined as a putative tendency of financial markets to trade into a particular direction over a period of time. It consists of a series of short-term random movements resembling successive waves with obvious peaks and troughs. The direction of these peaks and troughs constitutes the market trend. Trends can be classified according to either direction or timeframe applicable. An upward market trend is defined as a series of successively higher peaks and troughs, while a downtrend constitutes lower peaks and troughs. Horizontal peaks and troughs represent a sideways trend. Trend classification based on timeframes can be categorised as being

secular, intermediate or near-term in nature. Secular trends are also known as long-term cycles, and they last in excess of six months. Intermediate trends are defined as medium-term in nature while near-term trends are known as the shortest version based on duration. Trend-following strategies and approaches focus on intermediate trends in price discovery.

Researchers investigating the validity and effectiveness of trend-following risk management strategies have not reached consensus on the feasibility of trading on the back of identifiable market trends. Academic work supporting market trends cites empirical results as justification for strategies based on perceived market trends, while research opposing the existence of market trends highlights the random walk as main objection. Information on the average duration and magnitude of market trends can be useful in developing trading strategies. Research suggests historical intermediate upward volatility trends in corn futures contracts from February to July, followed by an intermediate downtrend lasting from August to December. This is supported by empirical evidence. Limited academic work has been done on the duration of price trends, but an investigation into historical corn prices indicates an intermediate uptrend from January to June, followed by an intermediate downtrend from July to December. This highlights the high degree of correlation evident between price and volatility.

The summary of the findings pertaining to the research questionnaire is presented in the following section.

10.3 SUMMARY OF FINDINGS FROM RESEARCH QUESTIONNAIRE

For the purposes of this study, a self-administered, internet-mediated questionnaire was used as data collection method. The most important findings pertaining to the questionnaire are presented below.

10.3.1 General findings of research questionnaire

- The results of the research conducted among producers, processors and speculators indicated that all three groups of stakeholders have a fundamental and essential exposure to corn price variability and market movement. In particular, speculators

indicated an overwhelmingly high exposure to changes in the price of corn. This can be attributed to the fact that their financial success is solely dependent on market price movements.

- In addition, producers and speculators agreed that their profitability is directly influenced by corn prices, while processors were undecided on the answer. This can be due to corn price fluctuations being passed on to the consumer, and therefore processors do not absorb the full impact of market volatility.

10.3.2 Findings pertaining to price volatility and forecastability

- Feedback received from respondents in the sample population confirmed that all three groups of stakeholders (producers, processors and speculators) experience corn price volatility as either stable or increasing; no stakeholders indicated a decreasing volatility trend. This confirms findings from previous studies and literature regarding volatility movements as discussed in Chapter 3.
- The stakeholders who were approached unanimously indicated that an increasing trend in corn price volatility indeed complicates trading decisions and therefore hampers their ability to hedge their respective businesses successfully and effectively.
- All of the respondents noted that the trading strategies implemented by their respective businesses consisted in part of a price-forecasting foundation in an attempt to anticipate future corn price movements as counter against price volatility.
- Since it was concluded that price forecasting does indeed form an essential part in the trading decisions of market participants, it was deemed necessary to determine the basis upon which forecasting decisions are made. The response from the sample showed that producers and processors generally prefer fundamental analysis, while speculators were divided between fundamental analysis and technical analysis as means of price forecasting. Surprisingly few stakeholders actually made use of trend analysis as a means of anticipating price movements.
- While price forecasting forms an indispensable part of trading decisions, it is important to rate the capability of market participants in order to forecast the future price movements of corn futures contracts accurately and consistently. From the feedback received, it was evident that neither producers nor processors or speculators had achieved any success of note through price forecasting. In particular, participants

confirmed that they were not able to accurately predict price movements on a consistent basis.

10.3.3 Findings pertaining to trading strategies implemented

- The target population was confronted with the question relating to the consistency with which trading strategies are implemented on an annual basis. Producers and processors indicated that they tend to implement a similar strategy annually, notwithstanding the underlying price trend. Speculators, however, confirmed that they actually adjusted their respective trading methodologies to adjust to bullish, bearish or neutral price trends.
- Through the research questionnaire, it was determined that producers, on average, hedge a substantially bigger percentage of their total portfolio upfront compared to that of processors. This is in direct contrast to the proposed trading methodology which, from the outset, eliminates price risk for the total volume of grain to be traded annually. Of importance, though, was the conclusion that age does play an important role in hedging strategies, with producers in a younger age category being more willing to engage in derivative trading than their older counterparts.
- Producers place more value on the incorporation of a force majeure characteristic in their trading strategies than do processors. Therefore, producers are more likely to make use of options contracts in the implementation of their trading strategies.
- Since the majority of producers make use of options contracts, they are able to keep up with price movement. This is not true for processors and speculators, as they tend to be reluctant to incorporate options contracts in their hedging portfolio.
- The feedback received from respondents confirmed that none of the alternative segments of market stakeholders were able to exploit price volatility for their own financial benefit.

10.3.4 Findings pertaining to appropriate price benchmark

- Market participants in the sample population were asked to indicate which return was generally used to judge their pricing performance. The majority of respondents across the market segments favoured either the average futures price over the contract life-time, or a return superior to the average price as most appropriate benchmark. This is consistent with previous studies on this subject as discussed in Chapter 9.

- None of the respondents in the research questionnaire indicated that they have taken notice of a methodology which has proved to yield annual returns superior to the average price benchmark on a consistent basis, while possessing a force majeure characteristic and the ability to be implemented notwithstanding the underlying price trend.
- All of the respondents confirmed that, should such a strategy exist, they would consider implementing it for their respective businesses as it is expected to substantially enhance business profitability.
- Feedback indicated that market stakeholders would be willing to pay as much as 5%, on average, of the realised price for the implementation of a methodology as described above.

10.3.5 Findings pertaining to the feasibility of implementing the methodology

- In order for the proposed methodology to be of significance, all relevant stakeholders in the corn futures market should be able to implement the methodology immediately upon entering appropriate trading signals. This will only be possible when access to live futures prices and technical trading data, as well as the ability to enter into a trade on any given trading day, is not limited. All of the respondents indicated that they had direct or indirect access to live futures prices, technical data and the ability to enter into a trade. As such, the methodology was feasible from a practical point of view.

The next section will summarise the findings and conclusions derived from the application of the proposed price risk management methodology.

10.4 SUMMARY OF FINDINGS FROM APPLICATION OF METHODOLOGY

Essential to its acceptance, the returns achieved by the proposed methodology needs to compare favourably to that of a pre-determined market benchmark. Once the benchmark was identified, the methodology was applied to historical corn futures prices over a ten-year period as well as ten sets of randomly chosen price data.

10.4.1 Choice of market benchmark

The market benchmark selected for comparative purposes was based upon the standard measurement of choice as indicated by respondents by means of the assessment instrument. In addition, the industry standards regarding performance assessment as well as the market benchmark applied in previous studies on the same topic were taken into consideration.

Feedback from respondents via the research questionnaire indicated that market participants favoured comparison of performance against the average market price over the period under consideration. Complementing this view, a popular standard of performance measurement in financial markets is to compare investment returns against external benchmarks such as the market index (a passive average of similar assets). Previous research on the subject also made use of a market average, as based upon the efficient market hypothesis, in order to evaluate the realised returns from strategies applied. The market average is calculated as a naïve strategy of marketing equal amounts of grain each day during the marketing window period. The value of the proposed trading methodology was therefore calculated as the difference in returns achieved by the methodology versus the average market price. The theory of efficient markets predicts that this difference will, on average, equal zero.

10.4.2 Comparison versus historical data

The proposed price risk management methodology can only be considered successful in contesting the notion of efficient markets if it is able to consistently achieve returns superior to that of the chosen benchmark, i.e. the average market price. For this purposes, the methodology was applied to historical trading data over the period 2000–2009 (10 years).

Results from the application of the methodology confirm that a long position is consistently obtained at a price level lower than the comparative benchmark after adjusting for relevant option costs. Similarly, short positions over the 10-year period is realised at a price level superior to that of the benchmark, even after subtracting all relevant option costs. It can therefore be concluded that, since the methodology is able to realise a long position price level lower than that of the comparative benchmark as well as a short position price level higher than that of the comparative benchmark, speculative profits should materialise

when simultaneously engaging in a long- and short position by using exactly the same methodology. As such, the conclusion can be reached that the methodology has a high degree of price forecastability by which market movement can be exploited.

10.4.3 Comparison versus randomly chosen data

For the ultimate confirmation regarding the acceptance of the methodology, it is important to obtain scientific credibility and prevent the possibility of data snooping or bias when applying the derivative price risk management methodology on sets of price data. For this reason, a number of data sets were randomly drawn after which the methodology was applied on the prices obtained. A successful application would further enhance the feasibility of the methodology and provide additional support for its acceptance in contesting the efficient market hypothesis.

From the results obtained by way of the application of the methodology on the randomly chosen sets of data, it was evident that the relevant benchmark was consistently outperformed even after adjusting for option costs. It is therefore suggested that the methodology is indeed capable of successfully contesting the notion of efficient markets.

10.5 CONCLUSIONS

This study indicated that the majority of previous research on the subject accepts and confirms the validity of the efficient market hypothesis. A literature study among producers, processors, speculators and market advisory services further enhanced the view that market participants are unable to mitigate the risk of price movement and subsequently cannot outperform the returns offered by the market. An analysis of the feedback from the research questionnaire, as provided by market participants included in the sample population, confirmed the difficulty faced by all traders in accurately forecasting future price movements and effectively mitigating the risk of market volatility.

Chapter 6 investigated the effectiveness of applying technical oscillators on futures prices with the objective of accurately forecasting future price movements. Chapter 7 discussed the possible existence of trends in corn futures prices as well as corn price volatility levels. The results obtained in these chapters were combined in Chapter 9 by means of a

blueprint that can be used to establish returns consistently superior to the average market return. This blueprint, or otherwise referred to as the price risk management methodology, aims to create social wealth through an increase in profits. This is achieved by creating the trading methodology in a manner that does not rely on human intervention but rather implies that the art of trading should be performed in a routine process as stipulated by the methodology.

The underlying concept of the methodology is to allow the user to enter into trades not based on emotion or market sentiment, but rather on a trading signal which is based on a basic market analysis that does not have to incorporate human intervention. Upon implementing these trading signals, the user should achieve profits superior to the average market return. This methodology addresses the problems as highlighted in the empirical research regarding the need for a strategy which mitigates risk, incorporates a force majeure and provides superior returns. In short, the methodology improves decision-making by allowing the trader to base trading decisions on an automated trading suggestion.

Since the average market return is outperformed on a consistent basis, the efficient market hypothesis is contested successfully and previous findings supporting the hypothesis should be questioned. Even though the view that futures prices already incorporate all relevant market information is not questioned, it is suggested that a thorough market analysis may allow for trading opportunities which might deliver superior results.

The proposed methodology does not suggest being exhaustive in any manner, and similar alternative strategies should exist in theory. It does however confirm that market participants should be able to exploit market movement for their benefit. After considering the results of this study, the following recommendations are made to assist traders in mitigating the impact of price volatility:

- Increase individual knowledge on derivative instruments through thorough education on the mathematics underlying futures and options contracts.
- Support the development of core/satellite price risk management strategies which consist of trading methodologies based on an indexing strategy.

- The trading function should in part be outsourced to professionals specialising in exotic options based on the expectation of achieving average prices.

10.6 RECOMMENDATIONS FOR FURTHER RESEARCH

The research study was undertaken within the international corn futures trading environment but, given the inherent characteristics of the trading methodology, it should be easily transferable to other grain markets. The application of the methodology was relatively homogeneous and only minor adjustments might be necessary should it be applied in alternative grain markets or different countries.

The logical extension resulting from this study is to apply the methodology to alternative commodity futures markets (excluding corn). The returns achieved are expected to be highly correlated to those as described in Chapter 9. Applying the strategy to futures contracts with an underlying asset other than commodities should also be considered, since those market trends should not necessarily adhere to the trends of commodity futures contracts and should require amendments to be made to the methodology.

Speculative transactions are generally short-term in nature, but the feasibility of implementing methodologies (such as proposed in this study) which last up to a year should be determined. The extent to which speculators are less exposed to market fluctuations compared to typical futures-only strategies also warrants further investigation.

This research project was cutting edge since the topic of developing trading methodologies which successfully contrast the efficient market hypothesis is still in its infant stage within the global trading environment. The final suggestion in terms of further research would be the development of a model whereby the price of consumable goods obtained from the commodity underlying the derivative instrument is adjusted in order to reflect price fluctuations in bearish, neutral or bullish markets.

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APPENDIX I

DAILY DECEMBER CORN FUTURES CLOSING PRICES AND TECHNICAL OSCILLATORS 2000 - 2009

2000

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
19991202	232.00	233.50	232.50							
19991203	231.25	232.50	231.50							
19991206	230.75	234.50	234.00							
19991207	232.50	234.00	233.00							
19991208	230.00	231.50	230.25							
19991209	227.00	230.50	227.00							
19991210	226.25	228.50	228.25							
19991213	225.25	226.50	226.00							
19991214	225.25	228.50	228.25				230.08			
19991215	226.25	228.00	227.75				229.56			
19991216	227.75	230.00	228.75				229.25			
19991217	229.00	230.50	230.00				228.81			
19991220	231.00	232.50	232.25				228.72			
19991221	230.75	232.25	231.00				228.81			
19991222	230.50	232.75	232.50				229.42			
19991223	232.25	233.75	233.50	76.58		54.17	230.00			
19991227	232.25	235.25	233.75	84.19		54.68	230.86			
19991228	232.25	234.00	233.75	86.40	82.39	54.68	231.47			
19991229	232.50	233.75	233.00	82.50	84.36	52.64	232.06			
19991230	232.50	234.25	233.75	82.50	83.80	54.47	232.61			
20000103	231.00	234.50	231.50	75.00	80.00	48.44	232.78	231.06		
20000104	231.00	233.00	232.50	73.33	76.94	51.03	232.81	231.06		
20000105	231.50	233.50	233.00	70.00	72.78	52.32	233.03	231.13		
20000106	233.00	235.50	234.00	76.05	73.13	54.89	233.19	231.13		
20000107	233.00	237.00	236.75	84.17	76.74	61.08	233.56	231.31		
20000110	235.25	238.75	238.50	91.50	83.91	64.42	234.08	231.70		
20000111	237.00	239.25	238.00	93.19	89.62	62.76	234.56	232.23		
20000112	242.00	246.50	245.25	91.62	92.10	73.45	235.92	233.04	245.25	
20000113	243.50	250.00	249.25	91.32	92.04	77.32	237.64	234.14	249.25	
20000114	247.00	250.00	248.75	93.89	92.28	75.83	239.56	235.12	248.75	
20000118	246.00	250.25	249.50	95.19	93.47	76.56	241.44	236.15	249.5	
20000119	248.75	251.50	251.25	96.10	95.06	78.21	243.47	237.23	251.25	
20000120	249.00	251.50	250.75	97.08	96.12	76.55	245.33	238.21	250.75	
20000121	250.00	252.75	252.50	97.99	97.06	78.28	247.08	239.18	252.5	
20000124	252.75	255.50	255.25	98.06	97.71	80.70	248.94	240.33	255.25	
20000125	254.25	256.00	255.75	98.94	98.33	81.11	250.92	241.44	255.75	
20000126	251.25	254.25	251.75	93.16	96.72	68.52	251.64	242.31		
20000127	250.25	255.00	254.50	91.33	94.47	71.77	252.22	243.30	254.5	
20000128	251.25	255.25	252.50	86.04	90.18	66.41	252.64	244.19		
20000131	247.50	249.75	248.50	79.05	85.47	57.20	252.53	244.93		
20000201	248.50	251.00	251.00	69.31	78.13	60.86	252.50	245.75		
20000202	249.75	252.50	250.50	60.27	69.54	59.76	252.47	246.65		
20000203	247.75	250.75	248.75	49.26	59.62	55.95	252.06	247.43		
20000204	246.00	251.50	251.00	44.50	51.34	59.52	251.58	248.29		
20000207	251.50	253.50	253.00	49.17	47.64	62.44	251.28	249.19		
20000208	250.75	253.75	252.75	62.50	52.06	61.84	251.39	249.95		
20000209	250.75	253.50	253.25	70.00	60.56	62.61	251.25	250.65		
20000210	253.00	256.00	255.50	78.33	70.28	65.95	251.58	251.49		
20000211	252.00	255.75	252.25	76.67	75.00	57.90	252.00	251.82		
20000214	252.75	255.00	253.00	75.83	76.94	59.14	252.22	252.00		
20000215	250.25	254.50	253.25	68.33	73.61	59.57	252.53	252.21		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20000216	252.00	255.00	254.25	75.00	73.06	61.31	253.14	252.44		
20000217	252.50	255.00	253.25	75.83	73.06	58.59	253.39	252.54		
20000218	252.00	253.50	252.50	73.33	74.72	56.56	253.33	252.62		
20000222	251.25	253.25	251.75	65.00	71.39	54.53	253.22	252.58		
20000223	246.25	250.00	246.75	43.33	60.56	43.35	252.50	252.18		
20000224	245.25	248.75	248.00	30.19	46.18	46.32	251.67	251.81		
20000225	245.00	248.00	245.25	11.78	28.44	41.21	250.89	251.50		
20000228	244.25	247.00	245.50	12.83	18.27	41.84	250.06	251.07		
20000229	245.50	250.50	249.75	19.91	14.84	51.35	249.67	250.94		
20000301	248.00	250.25	248.50	31.21	21.31	48.82	249.03	250.94		
20000302	247.25	249.75	248.75	40.70	30.61	49.36	248.53	250.83		
20000303	249.00	250.75	250.50	44.48	38.80	53.07	248.31	250.83		
20000306	249.50	253.25	253.00	59.56	48.25	57.83	248.44	251.04		
20000307	249.00	253.50	249.25	62.02	55.35	49.69	248.72	250.95		
20000308	248.50	252.25	250.25	61.24	60.94	51.65	248.97	250.82		
20000309	252.25	254.00	252.25	61.46	61.57	55.38	249.75	250.80		
20000310	250.75	253.25	252.00	72.45	65.05	54.81	250.47	250.74		
20000313	253.50	257.00	255.75	83.91	72.61	61.25	251.14	250.75		
20000314	256.50	262.00	261.75	89.42	81.93	68.89	252.61	251.20		
20000315	259.50	262.50	259.75	91.24	88.19	64.33	253.83	251.52		
20000316	257.75	262.50	258.50	87.20	89.29	61.59	254.72	251.77		
20000317	261.25	264.25	263.75	86.78	88.41	67.80	255.92	252.23		
20000320	256.50	260.25	259.25	82.00	85.33	59.00	257.03	252.51		
20000321	255.50	260.00	256.50	74.11	80.96	54.36	257.72	252.70		
20000322	256.00	259.00	258.75	63.36	73.16	57.32	258.44	253.04		
20000323	254.50	257.25	255.25	54.12	63.86	51.70	258.81	253.44		
20000324	256.00	258.75	257.25	54.50	57.32	54.45	258.97	253.88		
20000327	255.75	259.25	257.50	51.85	53.49	54.80	258.50	254.46		
20000328	251.00	257.00	251.25	38.80	48.38	45.49	257.56	254.74		
20000329	250.00	253.25	252.75	26.71	39.12	47.78	256.92	254.88		
20000330	254.50	258.50	258.00	26.38	30.63	54.93	256.28	255.33		
20000331	259.00	262.00	260.50	49.71	34.27	57.88	256.42	255.89		
20000403	259.25	264.25	259.50	65.50	47.20	56.29	256.75	256.32		
20000404	255.50	259.50	258.00	65.50	60.23	53.90	256.67	256.56		
20000405	256.00	259.75	258.00	59.65	63.55	53.90	256.97	256.98		
20000406	252.50	255.75	253.00	44.44	56.53	46.30	256.50	257.11		
20000407	251.25	255.25	254.75	36.84	46.98	49.01	256.19	257.23		
20000410	251.00	253.25	252.50	23.98	35.09	45.81	256.33	257.25		
20000411	248.75	252.75	249.25	18.03	26.28	41.58	255.94	256.94		
20000412	249.50	252.00	251.75	13.37	18.46	45.73	255.25	256.46		
20000413	251.50	254.50	253.75	18.28	16.56	48.86	254.50	256.18		
20000414	252.50	256.50	252.75	25.81	19.15	47.39	253.75	255.90		
20000417	249.75	253.50	250.75	23.66	22.58	44.50	252.94	255.29		
20000418	250.00	252.25	251.00	17.74	22.40	44.95	252.17	254.89		
20000419	251.75	255.00	254.50	21.51	20.97	50.96	252.33	254.80		
20000420	250.25	254.50	253.75	27.96	22.40	49.71	252.22	254.56		
20000424	251.75	255.62	254.50	40.54	30.00	51.01	252.44	254.52		
20000425	255.00	257.75	257.50	54.69	41.06	55.90	253.36	254.54		
20000426	254.00	258.75	254.50	63.11	52.78	50.47	253.67	254.39		
20000427	251.50	253.50	252.00	56.52	58.10	46.42	253.47	254.43		
20000428	249.50	252.75	250.00	34.17	51.26	43.42	253.17	254.30		
20000501	255.00	262.00	261.75	47.70	46.13	59.85	254.39	254.48		
20000502	261.75	265.50	262.75	64.48	48.78	60.89	255.69	254.58		
20000503	261.50	273.25	267.25	85.22	65.80	65.25	257.11	254.95		
20000504	264.50	267.75	266.25	76.03	75.24	63.55	258.50	255.35		
20000505	261.75	265.25	263.75	68.42	76.56	59.39	259.53	255.62		
20000508	257.00	262.00	257.50	54.74	66.39	50.50	259.53	255.83		
20000509	254.50	256.75	255.50	39.65	54.27	48.02	259.64	255.87		
20000510	257.00	262.50	260.75	35.44	43.27	54.35	260.61	256.26		
20000511	258.75	262.75	261.75	41.40	38.83	55.47	261.92	256.86		
20000512	257.50	264.00	263.50	52.63	43.16	57.42	262.11	257.42		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20000515	252.00	258.00	256.50	46.67	46.90	48.28	261.42	257.55		
20000516	252.75	258.25	253.00	34.39	44.56	44.47	259.83	257.56		
20000517	250.25	255.00	253.50	20.35	33.80	45.14	258.42	257.69		
20000518	255.25	260.25	256.25	19.22	24.65	48.78	257.58	257.94		
20000519	255.75	259.50	258.75	26.63	22.07	51.90	257.72	258.14		
20000522	256.25	262.00	259.75	34.78	26.88	53.13	258.19	258.43		
20000523	256.50	259.75	257.00	38.94	33.45	49.39	257.78	258.55		
20000524	252.25	255.25	253.25	33.29	35.67	44.76	256.83	258.35		
20000525	247.75	254.25	249.50	23.11	31.78	40.65	255.28	258.11		
20000526	249.00	252.50	252.25	19.49	25.30	44.66	254.81	258.12		
20000530	241.50	245.50	243.00	15.04	19.21	35.88	253.69	257.79		
20000531	241.25	244.50	244.00	15.48	16.67	37.31	252.64	256.94		
20000601	243.25	247.50	244.00	10.28	13.60	37.31	251.28	256.05		
20000602	244.50	248.75	248.50	19.71	15.16	43.87	250.14	255.15		
20000605	242.75	247.00	243.75	19.69	16.56	39.21	248.36	254.08		
20000606	241.75	245.00	244.75	21.29	20.23	40.64	247.00	253.18		
20000607	238.25	242.00	239.25	11.04	17.34	35.67	245.44	252.31		
20000608	236.50	239.50	238.50	9.64	13.99	35.04	244.22	251.50		
20000609	238.00	240.75	239.50	7.94	9.54	36.65	242.81	250.49		
20000612	228.00	235.00	228.50	7.06	8.21	28.35	241.19	248.90		228.5
20000613	227.50	230.25	228.00	5.05	6.68	28.04	239.42	247.21		228
20000614	220.50	225.50	223.25	3.84	5.32	25.21	237.11	245.63		223.25
20000615	224.00	227.25	225.75	8.79	5.89	29.25	234.58	244.33		225.75
20000616	227.25	230.00	227.50	16.44	9.69	32.02	232.78	243.10		
20000619	223.50	225.50	225.25	19.33	14.85	30.38	230.61	241.62		
20000620	220.75	223.75	222.50	16.22	17.33	28.45	228.75	239.89		222.5
20000621	221.75	225.50	223.75	11.80	15.79	30.61	227.11	238.18		
20000622	223.00	226.25	223.25	9.65	12.56	30.21	225.31	236.57		
20000623	219.00	222.00	219.25	7.61	9.69	27.21	224.28	234.95		219.25
20000626	213.50	216.25	214.75	5.24	7.50	24.29	222.81	233.30		214.75
20000627	216.50	218.25	217.25	6.37	6.41	28.86	222.14	231.63		217.25
20000628	212.75	216.00	213.00	6.35	5.99	25.99	220.72	230.20		213
20000629	215.00	217.00	216.00	9.75	7.49	31.19	219.44	228.87		
20000630	205.00	210.50	207.50	8.47	8.19	25.68	217.47	227.13		207.5
20000703	199.25	204.50	202.75	11.96	10.06	23.21	215.28	224.95		202.75
20000705	201.00	204.75	204.00	12.24	10.89	25.25	213.08	223.06		204
20000706	199.25	202.75	200.00	9.76	11.32	23.14	210.50	220.93		200
20000707	201.50	206.25	202.50	9.97	10.66	27.24	208.64	219.18		202.5
20000710	196.00	199.00	198.75	7.86	9.20	25.08	206.86	217.29		198.75
20000711	196.50	199.75	196.75	7.87	8.57	23.98	204.58	215.25		196.75
20000712	192.75	198.00	197.50	8.58	8.10	25.30	202.86	213.77		197.5
20000713	196.25	199.25	197.75	11.25	9.23	25.76	200.83	212.33		197.75
20000714	193.00	196.50	194.25	12.39	10.74	23.57	199.36	210.95		194.25
20000717	190.00	192.75	191.25	9.13	10.92	21.85	198.08	209.31		191.25
20000718	192.25	195.00	192.50	6.52	9.35	24.32	196.81	207.64		192.5
20000719	190.50	195.00	193.50	8.88	8.18	26.33	196.08	206.13		193.5
20000720	193.25	199.00	198.00	20.42	11.94	34.73	195.58	204.96		
20000721	197.00	200.00	199.75	37.33	22.21	37.70	195.69	203.82		
20000724	195.50	201.25	196.25	45.83	34.52	34.33	195.64	202.54		
20000725	193.00	195.25	194.75	42.56	41.91	32.97	195.33	201.37		
20000726	191.25	194.00	192.25	27.18	38.52	30.79	194.72	200.30		
20000727	192.25	194.75	192.75	22.51	30.75	31.76	194.56	199.13		
20000728	191.75	194.50	192.00	18.69	22.79	31.05	194.64	198.13		
20000731	189.00	194.00	192.25	22.92	21.37	31.60	194.61	197.00		
20000801	191.00	193.50	192.00	22.93	21.51	31.33	194.44	196.26		
20000802	192.50	194.25	192.75	27.21	24.35	33.16	193.86	195.79		
20000803	190.50	194.50	192.00	26.53	25.56	32.24	193.00	195.21		
20000804	190.50	192.75	190.75	23.13	25.62	30.70	192.39	194.77		
20000807	189.50	191.75	190.00	15.65	21.77	29.78	191.86	194.18		190
20000808	189.75	192.00	191.75	14.97	17.91	34.69	191.81	193.85		
20000809	189.75	191.25	190.75	14.97	15.19	33.26	191.58	193.56		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20000810	189.00	192.25	189.50	13.61	14.51	31.51	191.31	193.18		
20000811	185.50	188.25	187.25	12.11	13.56	28.60	190.75	192.68		187.25
20000814	186.75	188.75	188.00	16.35	14.02	30.89	190.31	192.38		
20000815	187.25	188.50	188.00	24.00	17.49	30.89	189.78	192.23		
20000816	188.00	191.75	191.00	38.39	26.25	39.85	189.67	192.15		
20000817	190.25	193.00	191.00	49.75	37.38	39.85	189.69	192.04		
20000818	189.50	191.00	189.75	56.48	48.21	37.50	189.67	191.64		
20000821	188.00	189.25	188.75	48.15	51.46	35.69	189.33	191.12		
20000822	187.75	190.00	188.00	37.04	47.22	34.35	189.03	190.73		
20000823	186.50	188.00	187.50	30.19	38.46	33.45	188.81	190.38		
20000824	186.75	188.75	188.25	30.37	32.53	36.15	188.92	190.19		
20000825	188.25	190.50	188.75	35.56	32.04	37.97	189.00	190.00		
20000828	190.00	195.00	191.75	48.60	38.17	47.59	189.42	189.99		
20000829	193.50	197.50	196.50	66.93	50.36	58.54	190.03	190.19		
20000830	193.50	197.00	193.75	75.40	63.64	51.79	190.33	190.27		
20000831	193.50	196.75	196.50	83.78	75.37	57.12	191.08	190.45		
20000901	194.00	195.75	194.25	76.70	78.63	52.05	191.69	190.56		
20000905	196.00	199.75	198.00	82.72	81.07	58.64	192.81	190.90		
20000906	193.50	196.50	193.75	70.65	76.69	50.22	193.50	191.08		
20000907	192.25	194.00	193.25	64.15	72.51	49.32	194.06	191.15		
20000908	194.25	196.50	195.50	57.86	64.22	53.36	194.81	191.38		
20000911	194.00	196.25	196.00	63.52	61.84	54.23	195.28	191.69		
20000912	191.50	194.25	194.00	65.41	62.26	50.19	195.00	192.01		
20000913	191.25	195.25	191.50	54.95	61.29	45.61	194.75	192.18		
20000914	189.50	191.25	189.75	35.40	51.92	42.67	194.00	192.26		
20000915	187.50	189.50	187.75	17.21	35.85	39.54	193.28	192.11		
20000918	186.75	190.50	189.50	12.08	21.56	43.45	192.33	192.04		
20000919	187.00	189.25	187.25	9.01	12.77	39.88	191.61	191.92		
20000920	187.50	190.00	188.00	11.54	10.88	41.60	191.03	191.88		
20000921	187.25	191.00	190.25	13.46	11.34	46.55	190.44	191.99		
20000922	190.25	195.00	194.00	30.77	18.59	53.61	190.22	192.30		
20000925	192.25	194.75	193.25	49.79	31.34	52.13	190.14	192.54		
20000926	193.75	196.25	194.50	67.31	49.29	54.39	190.47	192.81		
20000927	192.50	195.00	194.50	75.21	64.10	54.39	191.00	192.94		
20000928	195.50	197.00	196.25	83.89	75.47	57.64	191.94	192.93		
20000929	197.25	199.00	197.75	87.32	82.14	60.26	192.86	193.12		
20001002	196.75	200.75	199.25	90.59	87.27	62.74	194.19	193.25		
20001003	199.00	203.75	203.50	92.54	90.15	68.69	195.92	193.69		
20001004	202.50	206.25	204.25	92.52	91.88	69.62	197.47	193.99		
20001005	202.00	204.50	203.50	91.39	92.15	67.47	198.53	194.45		
20001006	202.25	206.00	203.25	86.69	90.20	66.74	199.64	194.93		
20001009	201.00	202.75	201.50	81.77	86.62	61.66	200.42	195.21		
20001010	200.75	204.00	203.50	81.65	83.37	64.94	201.42	195.57		
20001011	202.75	205.50	204.50	83.20	82.20	66.49	202.33	196.07		
20001012	207.75	211.00	208.00	86.20	83.68	71.26	203.47	196.86	208	
20001013	207.00	209.25	208.00	85.62	85.00	71.26	204.44	197.73	208	
20001016	206.25	208.25	206.75	81.60	84.47	67.29	204.81	198.63		
20001017	206.50	208.25	207.50	79.41	82.21	68.43	205.17	199.49		
20001018	205.75	207.25	206.25	73.70	78.24	64.41	205.47	200.39		
20001019	206.50	208.00	206.75	71.42	74.84	65.29	205.86	201.29		
20001020	205.00	207.50	205.25	62.98	69.37	60.47	206.28	202.00		
20001023	203.00	204.75	203.25	48.88	61.09	54.67	206.25	202.44		
20001024	202.50	204.50	204.00	36.06	49.31	56.36	206.19	202.95		
20001025	203.00	204.00	203.25	26.83	37.26	54.19	205.67	203.37		
20001026	202.00	203.50	202.25	23.58	28.82	51.34	205.03	203.74		
20001027	200.50	203.25	200.75	13.80	21.40	47.33	204.36	203.95		
20001030	200.25	201.50	200.50	6.45	14.61	46.67	203.58	204.08		
20001031	199.25	207.25	206.00	20.72	13.66	59.84	203.56	204.40		
20001101	205.00	209.50	206.00	41.88	23.01	59.84	203.47	204.52		
20001102	210.50	213.00	212.00	72.01	44.87	69.40	204.22	204.89		
20001103	211.75	214.00	213.25	84.50	66.13	70.95	205.33	205.36		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20001106	213.25	216.00	213.50	90.91	82.47	71.26	206.39	205.85		
20001107	212.25	215.00	214.75	90.84	88.75	72.84	207.67	206.48	214.75	
20001108	214.50	216.50	216.00	91.57	91.11	74.36	209.19	207.07	216	
20001109	212.25	215.25	213.75	91.23	91.22	67.09	210.64	207.51		
20001110	210.75	213.50	212.00	85.02	89.28	62.02	211.92	207.70		
20001113	210.50	212.00	211.25	75.85	84.03	59.92	212.50	207.86		
20001114	208.50	211.75	208.75	66.18	75.68	53.45	212.81	207.95		
20001115	207.25	209.25	207.50	57.49	66.51	50.51	212.31	207.95		
20001116	206.00	209.25	208.75	52.66	58.78	53.28	211.81	208.07		
20001117	210.00	212.00	211.25	57.49	55.88	58.30	211.56	208.29		
20001120	210.50	213.50	211.00	58.94	56.36	57.63	211.14	208.56		
20001121	209.75	211.00	210.75	55.66	57.36	56.93	210.56	208.92		
20001122	210.00	211.00	210.25	45.96	53.52	55.47	210.17	209.21		
20001124	210.50	212.00	211.25	45.24	48.95	57.80	210.08	209.60		
20001127	210.25	212.25	210.50	44.44	45.22	55.46	210.00	209.99		
20001128	207.25	209.75	207.75	36.51	42.06	47.83	209.89	210.32		
20001129	204.75	207.75	205.00	20.63	33.86	41.65	209.61	210.54		
20001130	204.25	209.25	208.75	22.57	26.57	50.95	209.61	210.67		
20001201	206.75	210.75	210.00	37.73	26.98	53.61	209.47	210.86		
20001204	209.00	210.75	209.75	56.76	39.02	52.99	209.33	210.75		
20001205	207.75	209.50	209.25	58.56	51.02	51.71	209.17	210.56		
20001206	208.00	209.25	208.50	53.15	56.16	49.76	208.97	210.32		
20001207	204.75	209.75	205.00	36.04	49.25	41.84	208.28	209.86		
20001208	204.25	209.75	209.25	36.04	41.74	51.86	208.14	209.54		
20001211	206.50	207.75	207.00	32.18	34.75	47.22	208.06	209.21		
20001212	205.75	207.00	206.75	39.89	36.04	46.72	208.25	208.96		
20001213	205.75	208.00	207.50	35.42	35.83	48.48	208.11	208.79		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2001

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20001201	250.00	253.25	252.50							
20001204	250.75	252.25	251.00							
20001205	249.75	251.75	251.50							
20001206	250.00	251.25	250.25							
20001207	246.75	251.50	247.50							
20001208	247.25	252.00	251.75							
20001211	249.50	250.75	250.75							
20001212	249.75	251.00	250.25							
20001213	249.50	251.75	251.00				250.72			
20001214	251.75	253.75	251.75				250.64			
20001215	251.25	253.25	251.50				250.69			
20001218	253.75	256.75	256.50				251.25			
20001219	255.50	258.25	258.00				252.11			
20001220	256.25	259.00	256.75				253.14			
20001221	255.75	258.00	257.50				253.78			
20001222	257.75	259.00	258.50	88.44		67.44	254.64			
20001226	257.50	258.75	258.00	91.84		65.79	255.50			
20001227	256.50	260.00	259.75	95.29	91.85	68.68	256.47			
20001228	259.50	262.00	260.50	93.26	93.46	69.85	257.44			
20001229	259.50	262.00	261.75	95.31	94.62	71.75	258.58			
20010102	257.75	262.00	258.25	85.94	91.51	60.30	258.78	254.54		
20010103	257.50	261.50	261.00	86.67	89.31	65.02	259.11	254.94		
20010104	259.50	261.25	261.00	84.23	85.61	65.02	259.58	255.42		
20010105	257.00	260.00	258.00	81.83	84.24	56.51	259.64	255.73		
20010108	256.25	258.00	258.00	68.33	78.13	56.51	259.58	256.10		
20010109	257.50	260.25	259.25	57.33	69.17	59.10	259.72	256.65		
20010110	259.00	261.75	261.50	67.07	64.25	63.33	259.92	257.12		
20010111	256.00	258.00	256.25	52.56	58.99	50.27	259.44	257.38		
20010112	253.75	256.25	254.25	35.35	51.66	46.35	258.61	257.57		
20010116	251.25	253.50	251.50	5.46	31.13	41.55	257.86	257.60		
20010117	251.25	253.00	252.25	5.90	15.57	43.27	256.89	257.62		
20010118	252.50	254.75	252.75	8.53	6.63	44.45	255.97	257.68		
20010119	249.25	253.00	249.50	8.41	7.61	38.81	255.03	257.35		
20010122	247.75	250.50	250.00	10.57	9.17	40.07	254.14	256.96		
20010123	248.50	250.75	248.75	8.30	9.09	37.97	252.97	256.58		
20010124	247.50	251.25	250.00	13.49	10.79	41.29	251.69	256.23		
20010125	248.00	250.25	248.25	9.98	10.59	38.21	250.81	255.74		
20010126	245.25	247.50	245.50	8.11	10.53	33.92	249.83	255.14		
20010129	243.00	245.25	244.25	4.48	7.52	32.16	249.03	254.40		
20010130	244.75	246.75	245.50	7.17	6.59	35.76	248.28	253.69		
20010131	243.75	246.00	244.50	10.00	7.22	34.19	247.36	252.87		
20010201	244.75	247.50	246.25	15.95	11.04	39.20	247.00	252.30		
20010202	246.25	249.25	248.75	27.82	17.93	45.58	246.86	251.71		
20010205	246.50	248.50	247.75	37.96	27.25	43.61	246.75	251.08		
20010206	245.75	249.75	248.75	46.10	37.29	46.12	246.61	250.64		
20010207	247.25	250.00	247.50	44.79	42.95	43.51	246.53	250.14		
20010208	245.00	246.75	245.25	40.40	43.76	39.22	246.50	249.48		
20010209	243.50	246.25	245.00	32.17	39.12	38.76	246.58	248.69		
20010212	244.25	246.25	244.50	23.23	31.94	37.81	246.47	248.13		
20010213	243.75	245.00	244.25	19.89	25.10	37.32	246.44	247.65		
20010214	245.00	247.25	246.75	29.66	24.26	45.03	246.50	247.43		
20010215	246.75	248.50	246.75	41.46	30.34	45.03	246.28	247.17		
20010216	245.25	247.75	246.50	51.10	40.74	44.40	246.14	246.87		
20010220	247.00	248.75	247.25	52.47	48.34	46.81	245.97	246.76		
20010221	245.00	247.25	245.25	43.59	49.05	41.62	245.72	246.54		
20010222	244.25	247.50	244.75	34.62	43.56	40.41	245.67	246.35		
20010223	243.50	245.00	244.00	17.95	32.05	38.60	245.56	246.06		
20010226	243.50	245.00	243.75	10.26	20.94	37.99	245.47	245.85		
20010227	244.25	245.75	245.50	14.10	14.10	44.60	245.61	245.85		
20010228	246.25	250.25	249.25	39.93	21.43	55.53	245.89	246.08		
20010301	248.00	252.00	251.00	68.06	40.70	59.54	246.36	246.35		
20010302	249.50	252.75	249.75	80.33	62.78	55.68	246.72	246.60		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20010305	249.25	251.75	249.50	73.56	73.98	54.91	246.97	246.75		
20010306	248.75	250.50	250.00	67.57	73.82	56.21	247.50	246.81		
20010307	247.00	251.00	247.25	58.56	66.56	48.01	247.78	246.79		
20010308	246.25	249.75	247.50	51.35	59.16	48.74	248.17	246.73		
20010309	246.50	248.50	247.00	40.54	50.15	47.31	248.53	246.70		
20010312	246.00	249.00	248.00	43.24	45.05	50.45	248.81	246.83		
20010313	246.75	249.25	247.25	42.34	42.04	48.13	248.58	246.94		
20010314	244.25	247.00	244.75	34.23	39.94	41.32	247.89	246.95		
20010315	237.25	244.50	237.75	19.09	31.89	28.96	246.56	246.64		
20010316	233.50	239.50	233.75	6.01	19.78	24.45	244.81	246.02		233.75
20010319	234.00	235.75	235.50	4.97	10.03	29.61	243.19	245.49		235.5
20010320	235.50	238.50	238.00	11.69	7.56	36.30	242.17	245.08		
20010321	232.00	237.50	236.25	18.08	11.58	33.87	240.92	244.56		
20010322	231.00	234.00	231.50	15.42	15.06	28.34	239.19	243.90		231.5
20010323	232.00	234.00	233.50	11.80	15.10	33.28	237.58	243.37		
20010326	235.00	236.75	236.00	13.30	13.51	38.95	236.33	242.99		
20010327	235.25	237.50	237.25	23.61	16.24	41.62	235.50	242.68		
20010328	234.75	236.75	235.50	27.66	21.53	39.05	235.25	242.20		
20010329	233.00	235.25	233.25	23.44	24.90	35.96	235.19	241.44		
20010330	229.00	240.50	230.00	13.97	21.69	32.03	234.58	240.44		
20010402	232.00	235.00	234.75	16.40	17.94	42.01	234.22	239.73		
20010403	233.00	237.00	235.75	26.81	19.06	43.88	234.17	239.07		
20010404	236.00	238.75	238.25	51.98	31.73	48.36	234.92	238.51		
20010405	235.75	240.50	239.00	70.31	49.70	49.66	235.53	238.12		
20010406	237.00	240.00	237.25	79.71	67.33	46.71	235.67	237.63		
20010409	237.00	239.75	237.25	76.81	75.61	46.71	235.67	237.17		
20010410	235.50	238.25	235.75	67.39	74.64	44.10	235.69	236.58		
20010411	235.75	237.75	237.50	68.12	70.77	47.76	236.17	236.12		
20010412	236.25	241.25	238.25	69.37	68.29	49.30	237.08	235.81		
20010416	238.00	241.50	239.00	76.47	71.32	50.85	237.56	235.87		
20010417	235.50	238.25	235.75	69.84	71.89	44.49	237.56	235.96		
20010418	234.00	236.00	235.00	60.67	68.99	43.15	237.19	235.94		
20010419	228.75	233.75	229.75	36.61	55.71	35.16	236.17	235.55		
20010420	227.50	230.50	227.75	19.21	38.83	32.68	235.11	235.14		
20010423	222.00	227.00	222.50	4.06	19.96	27.24	233.47	234.71		222.5
20010424	219.75	223.25	220.50	2.60	8.62	25.50	231.78	234.10		220.5
20010425	220.75	224.50	221.75	5.07	3.91	28.57	230.03	233.42		221.75
20010426	223.25	226.75	226.50	14.56	7.41	38.88	228.72	232.90		
20010427	222.50	225.25	223.00	18.39	12.67	34.89	226.94	232.31		
20010430	220.00	227.00	226.50	25.67	19.54	41.38	225.92	231.99		
20010501	225.00	230.00	226.75	26.05	23.37	41.82	225.00	231.83		
20010502	227.50	230.25	227.75	33.33	28.35	43.67	224.78	231.50		
20010503	226.75	230.00	227.00	34.10	31.16	42.58	224.69	231.08		
20010504	227.00	229.50	229.25	40.49	35.97	46.87	225.44	230.65		
20010507	225.75	230.00	227.00	43.10	39.23	43.38	226.17	230.08		
20010508	222.50	226.75	224.00	42.11	41.90	39.19	226.42	229.45		
20010509	223.25	224.75	224.00	38.17	41.13	39.19	226.14	228.82		
20010510	217.00	221.75	217.25	23.93	34.73	31.30	225.50	227.94		
20010511	215.75	217.75	216.00	14.38	25.49	30.09	224.33	226.92		
20010514	217.75	222.50	221.00	13.27	17.19	40.06	223.69	226.10		
20010515	219.00	222.25	220.50	23.56	17.07	39.45	222.89	225.21		
20010516	218.00	221.00	220.25	33.33	23.39	39.13	222.14	224.48		
20010517	218.75	220.50	220.25	31.61	29.50	39.13	221.14	223.77		
20010518	218.25	220.25	218.75	27.59	30.84	37.05	220.22	223.25		
20010521	212.25	216.75	212.50	17.70	25.63	29.91	218.94	222.52		212.5
20010522	209.75	213.00	210.00	7.77	17.69	27.62	217.39	221.93		210
20010523	210.00	212.00	211.25	3.34	9.61	30.49	216.72	221.49		
20010524	212.25	213.50	212.75	7.82	6.31	33.87	216.36	221.06		
20010525	210.00	213.00	210.25	8.39	6.52	31.15	215.17	220.29		
20010529	206.50	208.75	208.00	8.66	8.29	28.90	213.78	219.57		208
20010530	208.00	209.50	209.00	8.93	8.66	31.28	212.53	218.74		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20010531	209.50	212.00	211.50	18.36	11.98	36.95	211.56	218.01		
20010601	213.50	218.50	217.75	39.06	22.12	48.43	211.44	217.54		
20010604	214.00	216.75	215.00	51.84	36.42	44.58	211.72	216.96		
20010605	214.00	218.50	214.25	59.24	50.05	43.57	212.19	216.25		
20010606	213.00	218.00	217.25	61.40	57.50	48.61	212.86	215.79		
20010607	216.50	220.50	217.00	68.41	63.02	48.22	213.33	215.45		
20010608	215.00	216.75	215.50	72.02	67.28	45.87	213.92	215.05		
20010611	215.25	219.50	217.25	72.02	70.82	49.00	214.94	215.05		
20010612	214.50	218.50	215.75	69.05	71.03	46.51	215.69	215.04		
20010613	214.75	217.50	215.25	68.45	69.84	45.68	216.11	214.76		
20010614	213.25	215.75	213.50	59.52	65.67	42.80	215.64	214.43		
20010615	207.75	213.00	209.25	44.05	57.34	36.73	215.00	213.90		
20010618	205.75	210.00	209.00	30.56	44.71	36.40	214.42	213.37		
20010619	208.25	212.00	211.25	26.32	33.64	41.45	213.75	213.01		
20010620	208.50	212.00	208.75	26.55	27.81	37.86	212.83	212.83		
20010621	205.75	208.50	206.25	20.34	24.40	34.62	211.81	212.65		
20010622	205.25	208.00	205.50	8.46	18.45	33.69	210.50	212.38		
20010625	202.25	204.25	203.00	3.05	10.61	30.73	209.08	211.92		
20010626	202.75	204.00	203.75	4.66	5.39	32.64	207.81	211.61		
20010627	204.75	207.25	206.50	12.32	6.67	39.27	207.03	211.54		
20010628	206.75	209.00	208.25	22.55	13.17	43.11	206.92	211.50		
20010629	207.25	213.25	208.25	32.11	22.33	43.11	206.83	211.35		
20010702	205.25	211.25	210.75	42.48	32.38	48.50	206.78	211.01		
20010703	210.00	215.00	213.75	59.28	44.63	54.11	207.33	210.95		
20010705	213.00	219.75	217.25	75.55	59.10	59.64	208.56	211.10		
20010706	217.25	219.50	218.50	87.92	74.25	61.43	210.00	211.15		
20010709	217.00	223.50	223.25	92.46	85.31	67.35	212.25	211.45		
20010710	225.75	229.75	228.50	95.71	92.03	72.39	215.00	212.07	228.5	
20010711	234.00	241.00	236.50	94.22	94.13	77.98	218.33	212.99	236.5	
20010712	240.00	247.00	246.00	93.87	94.60	82.50	222.53	214.43	246	
20010713	235.00	243.00	236.50	87.56	91.88	67.55	225.67	215.44		
20010716	224.00	232.00	228.50	77.50	86.31	58.02	227.64	216.15		
20010717	235.50	242.50	236.50	69.96	78.34	63.56	230.17	217.45		
20010718	227.00	233.00	228.50	63.01	70.16	55.65	231.42	218.38		
20010719	225.00	228.50	228.25	61.98	64.98	55.42	232.50	219.19		
20010720	219.25	224.00	220.50	49.10	58.03	48.65	232.19	219.75		
20010723	215.25	221.00	220.75	40.22	50.43	48.87	231.33	220.44		
20010724	222.50	227.75	226.50	35.10	41.47	53.71	230.22	221.44		
20010725	226.75	231.50	231.25	39.72	38.35	57.31	228.58	222.79		
20010726	226.75	235.50	229.50	44.99	39.94	55.60	227.81	224.01		
20010727	229.50	232.50	231.75	49.08	44.60	57.36	228.17	225.21		
20010730	226.00	231.00	228.00	45.67	46.58	53.54	227.22	226.15		
20010731	224.25	230.50	230.25	46.46	47.07	55.46	227.42	227.20		
20010801	226.00	230.50	226.75	42.95	45.02	51.87	227.25	227.96		
20010802	224.25	230.00	225.00	41.49	43.63	50.12	227.75	228.50		
20010803	220.75	225.00	222.00	34.00	39.48	47.19	227.89	228.73		
20010806	220.25	225.00	224.25	35.00	36.83	49.57	227.64	229.00		
20010807	225.75	228.75	227.75	43.65	37.55	53.12	227.25	229.21		
20010808	228.00	230.75	229.50	58.85	45.83	54.83	227.25	229.26		
20010809	229.50	233.00	231.50	70.78	57.76	56.77	227.22	229.02		
20010810	234.00	237.75	234.25	76.87	68.83	59.35	227.92	228.46		
20010813	233.75	237.50	237.00	85.32	77.66	61.81	228.67	228.49		
20010814	233.25	234.75	234.00	84.76	82.32	57.71	229.47	228.75		
20010815	230.00	234.75	231.75	80.00	83.36	54.77	230.22	228.52		
20010816	228.25	233.00	229.50	65.71	76.83	51.93	231.06	228.57		
20010817	226.75	229.50	228.25	54.76	66.83	50.36	231.50	228.57		
20010820	223.25	226.25	225.00	41.90	54.13	46.44	231.19	228.79		
20010821	226.00	228.75	227.75	38.57	45.08	49.99	231.00	229.12		
20010822	227.00	229.50	228.00	38.10	39.52	50.31	230.61	229.19		
20010823	224.75	233.00	231.75	50.95	42.54	55.00	230.33	229.21		
20010824	227.50	232.50	228.25	48.16	45.74	50.24	229.36	229.15		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20010827	226.25	231.50	231.00	51.22	50.11	53.63	229.03	229.12		
20010828	228.50	234.00	229.00	42.53	47.30	50.91	228.72	229.17		
20010829	228.75	231.50	231.25	49.43	47.72	53.75	228.92	229.21		
20010830	229.00	232.25	230.00	47.40	46.45	51.95	229.11	229.37		
20010831	229.50	232.75	232.25	60.27	52.36	54.88	229.92	229.71		
20010904	229.75	232.00	231.25	65.06	57.58	53.33	230.31	230.15		
20010905	227.75	231.25	229.75	69.43	64.92	50.99	230.50	230.42		
20010906	226.00	227.75	226.25	52.65	62.38	45.94	229.89	230.35		
20010907	225.50	227.50	225.75	37.21	53.10	45.25	229.61	230.17		
20010910	224.00	227.00	226.50	25.39	38.41	46.55	229.11	229.93		
20010913	224.25	230.75	229.50	34.42	32.34	51.49	229.17	229.70		
20010914	224.00	226.50	224.25	27.50	29.10	43.84	228.39	229.10		
20010917	221.00	224.50	221.75	21.09	27.67	40.74	227.47	228.51		
20010918	218.25	222.75	218.50	3.29	17.29	37.07	225.94	227.88		
20010919	213.75	218.50	216.00	6.16	10.18	34.49	224.25	227.24		
20010920	215.00	220.00	218.75	13.00	7.48	39.47	223.03	226.79		
20010921	215.50	218.75	217.25	18.62	12.59	37.79	222.03	226.42		
20010924	215.50	218.25	215.75	18.42	16.68	36.12	220.92	225.85		
20010925	214.75	218.00	215.50	12.85	16.63	35.84	219.69	225.25		
20010926	214.50	217.25	216.75	12.42	14.56	38.44	218.28	224.54		
20010927	215.00	216.75	216.00	13.32	12.86	37.46	217.36	223.95		
20010928	214.00	216.25	214.50	11.60	12.45	35.51	216.56	223.17		
20011001	210.25	213.50	210.50	6.29	10.40	30.89	215.67	222.29		
20011002	208.75	211.50	209.25	2.63	6.84	29.59	214.92	221.24		209.25
20011003	208.25	211.00	210.75	5.73	4.88	33.21	214.03	220.32		
20011004	211.00	213.50	211.50	11.99	6.79	35.01	213.39	219.33		
20011005	210.00	214.50	214.25	25.03	14.25	41.26	213.22	218.52		
20011008	213.00	216.75	215.50	41.03	26.01	43.90	213.22	217.85		
20011009	212.50	216.00	213.00	47.84	37.96	40.03	212.81	217.21		
20011010	212.25	214.75	214.25	53.09	47.32	42.75	212.61	216.67		
20011011	213.00	215.00	213.25	49.19	50.04	41.14	212.47	216.04		
20011012	207.50	209.25	208.50	38.89	47.06	34.50	212.25	215.04		
20011015	205.50	208.75	206.00	21.26	36.45	31.61	211.89	214.17		
20011016	205.75	207.25	206.75	8.30	22.82	33.41	211.44	213.45		
20011017	204.75	208.25	207.75	13.46	14.34	35.84	211.03	212.94		
20011018	205.00	209.00	205.25	13.43	11.73	32.63	210.03	212.43		
20011019	204.50	207.00	205.50	12.44	13.11	33.28	208.92	211.80		
20011022	204.00	205.00	204.25	4.76	10.21	31.65	207.94	211.18		
20011023	203.75	205.50	204.25	4.66	7.29	31.65	206.83	210.63		
20011024	204.00	206.75	206.50	8.99	6.14	37.98	206.08	210.20		
20011025	205.50	207.50	206.50	15.38	9.68	37.98	205.86	209.71		
20011026	204.75	206.75	205.50	18.86	14.41	36.25	205.81	209.21		
20011029	202.00	205.00	203.50	15.66	16.64	33.01	205.44	208.69		
20011030	203.00	206.50	206.00	18.86	17.80	40.20	205.25	208.48		
20011031	204.50	206.75	205.50	30.19	21.57	39.29	205.28	208.30		
20011101	202.50	204.75	204.00	35.87	28.31	36.62	205.11	207.98		
20011102	202.00	204.00	202.25	26.81	30.96	33.74	204.89	207.54		
20011105	201.50	203.25	202.75	16.27	26.32	35.30	204.72	206.99		
20011106	202.25	204.75	202.50	11.19	18.09	34.86	204.28	206.37		
20011107	202.25	203.75	202.50	15.56	14.34	34.86	203.83	205.87		
20011108	201.75	203.50	202.75	16.94	14.56	35.80	203.53	205.32		
20011109	201.75	208.00	206.00	35.58	22.69	46.55	203.81	204.98		
20011112	205.00	207.00	206.00	53.10	35.21	46.55	203.81	204.86		
20011113	204.75	206.75	205.00	64.10	50.93	43.93	203.75	204.81		
20011114	205.00	207.75	206.50	66.67	61.29	48.61	204.03	204.80		
20011115	205.25	207.75	206.00	66.67	65.81	47.19	204.44	204.71		
20011116	205.00	207.50	207.25	78.21	70.51	51.03	204.94	204.81		
20011119	207.75	209.75	209.25	83.88	76.25	56.48	205.69	204.99		
20011120	208.25	210.00	208.75	89.23	83.77	54.84	206.39	205.20		
20011121	208.25	209.50	208.75	88.18	87.09	54.84	207.06	205.42		
20011123	207.75	209.25	208.25	83.33	86.91	53.05	207.31	205.50		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20011126	203.25	208.25	203.75	62.98	78.16	40.30	207.06	205.37		
20011127	202.75	204.25	203.75	42.63	62.98	40.30	206.92	205.29		
20011128	198.50	204.00	198.75	16.89	40.83	30.77	206.06	205.06		
20011129	198.25	201.00	199.75	13.06	24.19	34.13	205.36	204.76		
20011130	205.00	209.50	208.50	34.06	21.33	54.78	205.50	204.90		
20011203	207.25	210.00	209.75	65.96	37.69	56.86	205.56	205.18		
20011204	210.00	213.00	212.00	92.78	64.26	60.39	205.92	205.64		
20011205	208.75	211.25	209.75	89.69	82.81	55.50	206.03	205.98		
20011206	205.25	210.25	205.50	73.45	85.30	47.64	205.72	206.12		
20011207	204.00	211.00	208.25	64.97	76.03	52.34	206.22	206.39		
20011210	208.50	210.00	209.00	63.28	67.23	53.57	206.81	206.69		
20011211	208.25	210.50	209.50	72.32	66.85	54.41	208.00	206.86		
20011212	205.75	208.50	206.75	68.93	68.17	49.14	208.78	206.89		
20011213	204.25	207.50	207.25	64.97	68.74	50.08	208.64	207.00		
20011214	207.25	208.50	207.50	60.45	64.78	50.58	208.39	207.05		
20001213	205.75	208.00	207.50	35.42	35.83	48.48	208.11	208.79		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2002

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20011130	246.00	248.00	247.25							
20011203	243.25	247.75	244.75							
20011204	242.75	245.00	244.25							
20011205	242.00	243.50	243.25							
20011206	241.25	243.50	241.50							
20011207	241.00	245.50	242.50							
20011210	242.25	243.25	242.75							
20011211	241.75	243.50	242.75							
20011212	239.25	242.00	239.75				243.19			
20011213	237.00	240.00	239.75				242.36			
20011214	239.25	241.00	239.50				241.78			
20011217	236.25	239.25	237.50				241.03			
20011218	236.50	238.75	237.50				240.39			
20011219	236.50	238.75	237.50				239.94			
20011220	236.25	237.50	236.75				239.31			
20011221	235.00	237.50	235.25	5.79		10.42	238.47			
20011226	233.00	234.75	233.50	3.58		9.00	237.44			
20011227	233.50	234.25	234.00	4.79	4.72	12.65	236.81			
20011228	234.00	235.50	234.50	8.00	5.46	16.27	236.22			
20011231	233.75	235.25	234.75	12.22	8.34	18.09	235.69			
20020102	233.50	235.25	233.75	11.94	10.72	16.54	235.28	239.19		233.75
20020103	232.75	234.50	234.25	13.34	12.50	20.23	234.92	238.57		234.25
20020104	233.75	235.00	234.50	14.86	13.38	22.08	234.58	238.08		234.5
20020107	235.00	237.75	236.50	27.63	18.61	35.08	234.56	237.71		
20020108	235.75	238.25	238.00	49.15	30.54	42.79	234.86	237.46		
20020109	237.75	240.00	238.00	66.21	47.66	42.79	235.36	237.30		
20020110	236.25	237.50	237.00	70.60	61.99	39.19	235.69	237.04		
20020111	238.25	240.50	239.25	71.64	69.48	49.48	236.22	236.87		
20020114	238.25	241.50	238.50	69.40	70.55	46.65	236.64	236.67		
20020115	237.75	240.75	240.25	78.43	73.16	53.36	237.36	236.69		
20020116	239.50	242.00	241.75	82.91	76.91	58.21	238.19	236.79		
20020117	239.25	242.25	239.75	85.57	82.30	50.65	238.78	236.80		
20020118	238.25	239.50	238.75	78.05	82.17	47.33	239.03	236.86		
20020122	236.50	238.50	236.75	59.65	74.42	41.49	238.89	236.82		
20020123	235.00	236.75	236.50	48.25	61.98	40.81	238.72	236.77		
20020124	236.00	237.50	236.75	38.96	48.95	41.83	238.69	236.77		
20020125	236.00	237.75	236.25	30.67	39.29	40.33	238.36	236.82		
20020128	234.00	236.00	235.25	22.56	30.73	37.43	238.00	236.90		
20020129	233.50	235.50	233.75	11.75	21.66	33.54	237.28	236.89		
20020130	233.00	234.25	233.75	8.71	14.34	33.54	236.39	236.86		
20020131	233.25	235.00	233.75	6.36	8.94	33.54	235.72	236.81		
20020201	232.25	233.50	232.50	6.24	7.10	30.26	235.03	236.75		
20020204	232.50	234.50	233.75	8.54	7.04	36.90	234.69	236.73		
20020205	233.50	234.50	233.75	10.83	8.54	36.90	234.39	236.69		
20020206	231.00	234.25	231.25	10.74	10.04	30.23	233.78	236.44		
20020207	230.50	231.75	231.25	8.52	10.03	30.23	233.22	236.12		
20020208	231.00	232.50	231.25	6.64	8.63	30.23	232.78	235.80		
20020211	230.75	232.00	231.00	8.20	7.79	29.56	232.47	235.51		231
20020212	231.00	232.00	231.75	11.17	8.67	34.25	232.25	235.15		
20020213	231.75	235.00	234.75	27.59	15.65	48.91	232.36	234.98		
20020214	234.25	235.25	234.75	51.04	29.93	48.91	232.61	234.71		
20020215	232.25	235.00	232.75	60.30	46.31	41.72	232.50	234.29		
20020219	232.50	233.75	233.25	60.06	57.13	43.94	232.44	233.98		
20020220	233.00	235.00	234.75	64.12	61.49	50.08	232.83	233.79		
20020221	234.00	235.75	234.75	76.11	66.76	50.08	233.22	233.69		
20020222	233.00	235.25	233.25	74.27	71.50	44.43	233.44	233.54		
20020225	228.75	232.50	229.75	49.21	66.53	34.63	233.31	233.20		
20020226	227.00	230.25	227.25	23.17	48.88	29.60	232.81	232.77		
20020227	227.50	229.50	229.25	14.29	28.89	37.43	232.19	232.49		
20020228	228.50	231.50	229.75	20.00	19.15	39.24	231.64	232.30		
20020301	229.00	231.75	231.50	36.19	23.49	45.24	231.50	232.19		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20020304	229.50	232.75	230.00	39.05	31.75	41.46	231.14	232.01		
20020305	230.00	231.75	231.00	43.81	39.68	44.77	230.72	231.94		
20020306	228.75	231.00	230.00	38.10	40.32	42.20	230.19	231.76		
20020307	228.75	231.75	229.25	35.24	39.05	40.33	229.75	231.55		
20020308	228.25	231.50	229.50	29.52	34.29	41.27	229.72	231.46		
20020311	228.25	231.00	230.50	31.43	32.06	44.98	230.08	231.43		
20020312	231.00	233.00	231.00	38.10	33.02	46.79	230.28	231.42		
20020313	227.75	231.50	228.25	33.62	34.38	39.16	230.11	231.29		
20020314	228.25	230.25	228.50	28.62	33.45	40.11	229.78	231.13		
20020315	226.50	229.50	226.75	14.67	25.64	35.86	229.42	230.75		
20020318	225.50	228.25	227.25	17.39	20.23	37.89	229.00	230.39		
20020319	225.50	227.75	227.25	16.84	16.30	37.89	228.69	230.13		
20020320	226.00	228.25	226.75	21.11	18.45	36.55	228.42	229.82		
20020321	226.00	228.50	226.25	16.67	18.21	35.21	228.06	229.42		
20020322	225.25	226.75	225.50	9.96	15.91	33.24	227.50	228.98		
20020325	224.50	225.75	224.75	5.39	10.67	31.36	226.81	228.57		
20020326	225.25	226.75	225.50	5.98	7.11	35.31	226.50	228.37		
20020327	226.00	227.25	226.75	13.73	8.36	41.37	226.31	228.35		
20020328	222.75	227.25	224.00	16.81	12.17	33.86	226.00	228.10		
20020401	223.75	225.50	224.50	18.58	16.37	36.13	225.69	227.85		
20020402	224.75	226.00	224.75	17.38	17.59	37.29	225.42	227.52		
20020403	222.00	225.00	222.25	14.32	16.76	31.19	224.92	227.15		
20020404	221.75	223.75	222.25	10.78	14.16	31.19	224.47	226.74		
20020405	221.75	223.25	222.25	5.63	10.24	31.19	224.11	226.37		
20020408	221.50	223.75	223.00	11.76	9.39	35.16	223.92	226.07		
20020409	222.50	224.25	222.75	15.56	10.99	34.45	223.61	225.75		
20020410	221.00	225.00	221.25	14.21	13.84	30.45	223.00	225.31		
20020411	220.25	221.50	220.50	8.25	12.67	28.66	222.61	224.81		220.5
20020412	215.00	220.25	219.00	13.19	11.88	25.44	222.00	224.37		219
20020415	217.50	220.00	217.75	19.56	13.67	23.11	221.22	223.86		217.75
20020416	217.75	219.75	219.25	29.93	20.89	31.25	220.89	223.50		
20020417	218.25	221.50	221.00	35.37	28.29	39.32	220.75	223.20		
20020418	219.00	222.25	219.25	40.77	35.36	34.91	220.42	222.82		
20020419	216.75	220.00	217.00	35.27	37.14	30.21	219.75	222.36		
20020422	218.25	220.50	218.50	30.61	35.55	36.36	219.28	221.99		
20020423	217.75	220.00	219.25	31.89	32.59	39.24	219.06	221.69		
20020424	218.25	220.50	218.50	37.50	33.33	37.42	218.83	221.39		
20020425	218.50	220.25	218.50	37.50	35.63	37.42	218.78	221.06		
20020426	219.25	220.50	219.50	38.33	37.78	41.61	218.97	220.71		
20020429	216.75	221.00	217.00	33.33	36.39	35.25	218.72	220.38		
20020430	216.75	218.25	217.25	32.01	34.56	36.30	218.31	220.04		
20020501	217.25	220.25	219.75	38.85	34.73	45.76	218.36	219.80		
20020502	216.75	220.75	217.00	33.70	34.85	38.91	218.36	219.55		
20020503	216.25	218.00	217.75	31.69	34.75	41.49	218.28	219.33		
20020506	215.00	218.00	217.50	21.34	28.91	40.87	218.08	219.11		
20020507	219.25	222.50	221.50	48.72	33.92	52.94	218.42	219.04		
20020508	220.50	222.50	221.25	68.16	46.07	52.22	218.72	218.96		
20020509	221.50	223.75	221.75	82.38	66.42	53.58	218.97	218.99		
20020510	221.00	224.75	222.00	77.42	75.99	54.28	219.53	219.06		
20020513	226.50	230.75	230.50	82.45	80.75	70.52	221.00	219.61	230.5	
20020514	228.50	231.50	230.75	88.55	82.81	70.85	222.22	220.23	230.75	
20020515	229.75	232.00	231.75	97.47	89.49	72.18	223.86	220.82	231.75	
20020516	228.00	231.25	228.50	91.13	92.38	62.22	225.06	221.18		
20020517	223.75	227.00	224.25	77.45	88.68	52.10	225.81	221.42		
20020520	223.25	226.75	226.50	67.16	78.58	56.16	226.36	221.87		
20020521	224.75	228.25	226.25	62.75	69.12	55.60	226.92	222.24		
20020522	223.50	226.75	223.75	61.76	63.89	50.17	227.14	222.45		
20020523	221.25	224.75	223.75	56.37	60.29	50.17	227.33	222.70		
20020524	220.75	223.25	221.25	39.54	52.56	45.06	226.31	222.83		
20020528	220.50	224.50	224.00	32.53	42.82	50.97	225.56	223.05		
20020529	225.00	229.25	228.00	37.11	36.40	58.04	225.14	223.57		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20020530	226.00	229.75	229.50	57.97	42.54	60.35	225.25	224.15		
20020531	228.75	231.00	230.00	75.36	56.82	61.12	225.89	224.64		
20020603	225.25	227.75	226.25	70.29	67.87	52.85	225.86	225.08		
20020604	226.50	229.00	227.00	63.04	69.57	54.19	225.94	225.52		
20020605	224.75	227.25	226.75	54.89	62.74	53.64	226.28	225.96		
20020606	224.75	228.50	225.00	52.51	56.81	49.86	226.42	226.13		
20020607	222.00	223.75	222.50	40.01	49.14	44.98	226.56	226.19		
20020610	220.50	223.25	223.00	28.57	40.36	46.11	226.44	226.25		
20020611	219.75	222.25	220.00	15.03	27.87	40.69	225.56	226.15		
20020612	221.75	225.00	223.00	18.31	20.63	47.36	224.83	225.80		
20020613	223.25	228.50	227.50	33.33	22.22	55.45	224.56	225.64		
20020614	225.00	227.50	225.50	49.63	33.76	51.65	224.47	225.35		
20020617	223.75	226.00	224.50	54.07	45.68	49.81	224.19	225.15		
20020618	222.00	224.75	222.75	40.00	47.90	46.68	223.75	225.08		
20020619	222.50	225.50	224.25	36.30	43.46	49.61	223.67	224.98		
20020620	226.00	227.75	226.25	45.65	40.65	53.29	224.08	224.98		
20020621	226.25	227.75	226.75	61.98	47.97	54.19	224.50	225.12		
20020624	232.50	239.50	235.50	75.23	60.95	66.40	226.22	225.68		
20020625	235.75	239.00	238.50	83.45	73.56	69.41	227.94	226.50		
20020626	237.50	241.25	239.75	89.24	82.64	70.59	229.31	227.25	239.75	
20020627	238.50	245.00	244.50	95.33	89.34	74.60	231.42	228.04	244.5	
20020628	242.50	248.00	243.50	91.70	92.09	72.36	233.53	228.70	243.5	
20020701	248.00	252.50	251.25	92.68	93.24	77.90	236.69	229.71	251.25	
20020702	243.50	252.50	246.00	86.23	90.20	67.97	239.11	230.65		
20020703	239.50	243.25	241.75	79.79	86.23	61.16	240.83	231.36		
20020705	240.50	247.00	246.50	74.59	80.20	65.34	243.03	232.30		
20020708	238.50	242.75	239.50	67.49	73.96	55.82	243.47	232.99		
20020709	242.25	246.50	242.50	68.12	70.07	58.60	243.92	233.94		
20020710	236.00	239.25	238.50	57.07	64.23	53.74	243.78	234.68		
20020711	232.25	237.50	233.75	47.47	57.55	48.58	242.58	235.33		
20020712	229.75	233.25	232.75	29.64	44.73	47.55	241.39	235.80		
20020715	236.50	239.25	237.25	24.91	34.01	52.45	239.83	236.26		
20020716	241.50	245.00	244.50	37.00	30.52	59.09	239.67	237.17		
20020717	239.50	243.75	241.50	49.82	37.24	55.63	239.64	237.98		
20020718	239.50	243.50	242.50	57.51	48.11	56.54	239.19	238.92		
20020719	239.50	245.00	244.75	57.88	55.07	58.61	239.78	239.89		
20020722	250.00	257.50	256.00	72.19	62.53	67.04	241.28	241.31		
20020723	250.50	255.50	251.25	79.34	69.80	61.36	242.69	242.48		
20020724	252.00	260.00	259.25	89.86	80.46	66.51	245.53	243.61		
20020725	250.50	256.50	254.25	85.33	84.84	61.03	247.92	244.36		
20020726	251.50	255.75	252.75	84.85	86.68	59.45	249.64	244.98		
20020729	239.50	244.00	240.25	63.91	78.03	48.24	249.17	244.77		
20020730	241.00	246.50	245.75	54.55	67.77	52.48	249.64	244.88		
20020731	253.00	257.75	256.50	58.68	59.04	59.48	251.19	245.13		
20020801	254.00	265.50	258.75	72.68	61.97	60.78	252.75	245.74		
20020802	259.50	264.75	263.00	85.18	72.18	63.19	253.53	246.75		
20020805	255.00	264.75	263.75	86.79	81.55	63.61	254.92	247.57		
20020806	261.50	264.50	262.00	90.06	87.35	61.82	255.22	248.64		
20020807	259.00	261.75	260.00	86.22	87.69	59.75	255.86	249.48		
20020808	256.25	259.25	257.25	77.88	84.72	56.93	256.36	250.37		
20020809	256.00	262.00	261.50	77.24	80.45	60.07	258.72	251.69		
20020812	272.00	279.00	272.25	78.60	77.91	66.68	261.67	253.57		
20020813	272.50	280.50	279.50	88.36	81.40	70.26	264.22	255.58	279.5	
20020814	279.50	287.50	284.75	91.58	86.18	72.56	267.11	257.50	284.75	
20020815	281.00	288.50	284.00	94.22	91.39	71.71	269.44	259.52	284	
20020816	279.25	282.75	282.50	90.82	92.21	69.94	271.53	261.43		
20020819	275.50	279.50	277.50	82.40	89.14	64.25	273.25	262.99		
20020820	270.50	275.00	270.75	68.31	80.51	57.45	274.44	263.69		
20020821	268.50	273.50	272.50	56.60	69.10	58.67	276.14	264.70		
20020822	267.75	272.00	271.50	50.01	58.31	57.65	277.25	265.29		
20020823	271.25	275.50	273.50	51.78	52.80	59.18	277.39	266.20		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20020826	273.00	276.25	274.75	53.60	51.80	60.14	276.86	267.25		
20020827	271.75	274.25	272.25	53.85	53.07	57.23	275.47	268.77		
20020828	270.00	272.75	270.25	50.51	52.65	54.93	273.94	269.94		
20020829	266.25	269.00	266.75	32.03	45.46	51.07	272.19	270.43		
20020830	265.75	268.75	268.00	18.66	33.74	52.36	271.14	270.87		
20020903	271.50	275.50	274.25	16.50	22.40	58.27	271.53	271.40		
20020904	274.25	279.75	278.50	34.43	23.20	61.75	272.19	272.11		
20020905	276.25	281.00	280.50	60.06	37.00	63.30	273.19	272.99		
20020906	280.75	283.50	283.25	80.47	58.32	65.38	274.28	274.10		
20020909	288.00	296.00	289.25	87.68	76.07	69.44	275.89	275.62		
20020910	285.00	291.00	287.50	82.73	83.62	66.97	277.58	276.86		
20020911	285.75	293.00	292.50	79.34	83.25	70.23	280.06	277.82	292.5	
20020912	282.25	291.00	283.25	72.73	78.26	58.70	281.89	278.00		
20020913	276.00	280.00	276.25	60.33	70.80	51.77	282.81	277.60		
20020916	272.00	278.25	278.00	44.35	59.14	53.25	283.22	277.31		
20020917	272.50	278.00	276.50	36.91	47.20	51.78	283.00	277.02		
20020918	271.75	277.00	272.50	32.78	38.02	47.97	282.11	276.79		
20020919	266.50	271.00	266.75	20.39	30.03	43.07	280.28	276.60		
20020920	260.00	265.75	260.75	9.23	20.80	38.63	277.11	276.04		
20020923	253.75	259.75	254.25	2.19	10.60	34.48	273.42	275.21		
20020924	254.75	260.00	259.50	5.63	5.68	40.08	269.75	274.55		
20020925	256.75	262.00	258.50	8.68	5.50	39.39	267.00	273.77		
20020926	258.50	261.00	260.50	13.61	9.30	41.55	265.25	273.21		
20020927	257.50	261.00	258.75	13.32	11.87	40.20	263.11	272.67		
20020930	249.50	259.50	251.50	11.10	12.68	35.10	260.33	271.94		
20021001	250.00	256.50	255.75	10.80	11.74	39.91	258.47	271.36		
20021002	255.75	258.50	257.00	14.75	12.22	41.29	257.39	270.54		
20021003	252.25	255.50	254.50	19.01	14.85	39.35	256.69	269.39		
20021004	255.00	260.25	257.75	23.64	19.14	43.10	257.08	268.31		
20021007	256.50	261.75	260.00	28.17	23.61	45.61	257.14	267.20		
20021008	257.25	260.25	257.50	34.78	28.87	43.32	257.03	265.69		
20021009	255.50	257.75	256.00	38.46	33.81	41.96	256.53	264.19		
20021010	251.25	255.75	251.50	31.07	34.77	38.10	255.72	262.24		
20021011	246.50	251.25	246.75	19.20	29.58	34.49	255.19	260.50		
20021014	243.25	247.00	245.50	9.87	20.05	33.59	254.06	259.04		
20021015	247.00	254.50	254.00	23.91	17.66	44.26	253.72	257.89		
20021016	251.00	257.50	253.25	41.39	25.06	43.60	253.58	256.79		
20021017	250.50	259.50	255.50	59.46	41.58	46.21	253.33	255.98		
20021018	253.75	256.25	254.25	59.91	53.59	44.96	252.69	255.38		
20021021	254.00	257.50	254.25	61.71	60.36	44.96	252.33	255.07		
20021022	250.50	252.75	251.50	54.50	58.71	42.07	251.83	254.94		
20021023	250.00	252.50	250.25	47.30	54.50	40.78	251.69	254.50		
20021024	247.75	251.75	250.25	40.09	47.30	40.78	252.08	254.11		
20021025	248.50	250.50	250.25	38.95	42.11	40.78	252.61	253.62		
20021028	247.25	250.75	247.50	35.06	38.03	37.62	251.89	253.08		
20021029	245.75	250.25	249.00	34.24	36.08	40.34	251.42	252.96		
20021030	245.75	250.50	246.00	26.15	31.82	36.88	250.36	252.50		
20021031	246.00	249.00	247.50	26.15	28.85	39.67	249.61	252.05		
20021101	246.00	249.50	247.50	18.60	23.64	39.67	248.86	251.71		
20021104	244.00	247.50	244.25	13.50	19.42	35.71	248.06	251.07		
20021105	241.75	244.75	242.00	5.25	12.45	33.23	247.14	250.21		
20021106	240.50	245.25	243.00	5.91	8.22	35.38	246.33	249.52		
20021107	240.75	243.00	241.00	6.35	5.84	33.09	245.31	248.81		
20021108	235.50	240.50	235.75	6.37	6.21	27.98	244.00	248.06		235.75
20021111	234.00	236.75	235.75	4.62	5.78	27.98	242.53	247.54		235.75
20021112	237.75	240.50	238.25	11.62	7.53	33.64	241.67	247.19		
20021113	236.50	243.00	240.50	24.07	13.43	38.34	240.89	246.55		
20021114	241.50	245.00	244.00	40.82	25.50	44.88	240.50	246.11		
20021115	240.75	245.75	242.00	49.00	37.96	42.13	240.25	245.46		
20021118	240.25	244.50	243.75	55.76	48.52	45.28	240.44	244.96		
20021119	243.50	248.25	247.50	64.89	56.55	51.40	240.94	244.64		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20021120	245.25	249.00	248.00	78.84	66.50	52.17	241.72	244.48		
20021121	246.00	249.00	246.50	86.92	76.88	49.64	242.92	244.30		
20021122	245.75	248.50	247.75	88.44	84.73	51.74	244.25	244.18		
20021125	242.50	247.00	243.25	78.89	84.75	44.53	244.81	243.85		
20021126	242.00	244.50	242.25	69.44	78.92	43.09	245.00	243.60		
20021127	240.50	243.25	240.75	53.89	67.41	40.96	244.64	243.20		
20021129	240.00	243.25	240.25	47.22	56.85	40.24	244.44	242.93		
20021202	240.00	242.50	240.25	38.89	46.67	40.24	244.06	242.58		
20021203	237.50	240.00	237.75	27.22	37.78	36.54	242.97	242.12		
20021204	236.00	239.50	237.75	17.82	27.98	36.54	241.83	241.81		
20021205	233.25	237.50	234.00	9.41	18.15	31.49	240.44	241.43		
20021206	231.50	234.25	233.25	9.41	12.21	30.58	238.83	240.96		
20021209	231.25	233.75	232.00	6.33	8.38	29.08	237.58	240.54		232
20021210	232.25	234.75	234.50	10.85	8.86	35.88	236.72	240.48		
20021211	235.00	238.25	237.75	19.72	12.30	43.47	236.39	240.57		
20021212	233.00	237.50	236.00	27.49	19.35	40.68	235.92	240.46		
20021213	235.50	238.75	235.50	30.38	25.86	39.89	235.39	240.23		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2003

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20021202	240.00	241.75	240.00							
20021203	238.50	240.25	238.75							
20021204	238.25	242.50	242.25							
20021205	238.75	241.25	239.00							
20021206	238.00	240.00	238.25							
20021209	238.00	239.00	238.25							
20021210	238.25	239.50	238.50							
20021211	238.00	240.00	239.25							
20021212	238.00	239.50	238.75				239.22			
20021213	239.00	241.00	240.50				239.28			
20021216	238.50	241.75	239.00				239.31			
20021217	238.75	240.50	240.00				239.06			
20021218	240.25	242.50	241.50				239.33			
20021219	240.00	242.25	241.25				239.67			
20021220	240.50	242.00	240.75				239.94			
20021223	240.50	242.50	242.00	74.07		59.70	240.33			
20021226	241.25	243.25	242.50	78.57		60.96	240.69			
20021227	241.25	242.50	241.50	80.42	77.69	57.12	241.00			
20021230	240.25	241.50	240.75	68.25	75.75	54.36	241.03			
20021231	240.00	241.00	240.75	57.14	68.61	54.36	241.22			
20030102	240.00	242.25	241.75	58.73	61.38	57.54	241.42	240.25		
20030103	240.00	241.25	240.75	58.73	58.20	53.53	241.33	240.29		
20030106	241.00	241.75	241.50	62.32	59.93	56.00	241.36	240.42		
20030107	241.50	244.25	243.75	68.95	63.33	62.46	241.69	240.49		
20030108	244.50	246.75	246.00	81.70	70.99	67.59	242.14	240.82		
20030109	244.25	245.75	244.75	84.10	78.25	62.48	242.39	241.13		
20030110	240.75	242.75	241.00	58.60	74.80	50.23	242.33	241.26		
20030113	238.25	240.75	239.75	34.28	58.99	46.93	242.22	241.32		
20030114	237.75	240.75	238.50	13.60	35.49	43.82	241.97	241.29		
20030115	238.00	239.75	239.50	15.14	21.01	46.85	241.72	241.32		
20030116	237.50	239.25	238.50	12.86	13.87	44.28	241.47	241.23		
20030117	237.00	239.00	238.50	15.21	14.41	44.28	241.14	241.20		
20030121	238.00	239.75	239.25	16.42	14.83	46.82	240.64	241.17		
20030122	239.50	240.75	240.00	23.08	18.24	49.31	239.97	241.10		
20030123	240.00	242.25	241.00	31.62	23.71	52.50	239.56	241.08		
20030124	240.25	241.75	240.75	36.75	30.48	51.62	239.53	241.08		
20030127	240.75	242.00	240.75	39.32	35.90	51.62	239.64	241.02		
20030128	240.75	243.00	242.75	45.30	40.46	58.10	240.11	241.04		
20030129	240.25	242.25	240.50	45.81	43.48	49.99	240.22	240.99		
20030130	239.50	242.25	241.75	59.38	50.16	53.84	240.58	241.04		
20030131	242.00	244.50	244.00	70.83	58.68	59.84	241.19	241.19		
20030203	242.50	244.00	243.50	86.39	72.20	58.04	241.67	241.27		
20030204	242.75	245.25	244.25	89.29	82.17	59.99	242.14	241.44		
20030205	243.25	244.50	243.75	85.45	87.05	58.05	242.44	241.55		
20030206	242.50	246.00	245.00	86.20	86.98	61.41	242.92	241.61		
20030207	244.75	247.00	245.25	83.75	85.13	62.06	243.42	241.57		
20030210	246.00	247.75	246.25	83.75	84.57	64.64	243.81	241.64		
20030211	245.50	246.75	246.50	82.41	83.31	65.27	244.47	241.90		
20030212	242.25	247.75	244.00	73.74	79.97	54.69	244.72	242.11		
20030213	243.50	244.75	244.00	64.65	73.60	54.69	244.72	242.37		
20030214	244.00	245.25	244.75	57.58	65.32	57.11	244.86	242.62		
20030218	242.75	244.00	243.75	56.57	59.60	53.04	244.81	242.87		
20030219	240.75	243.00	241.00	44.44	52.86	43.80	244.50	242.99		
20030220	239.50	240.75	239.75	24.24	41.75	40.36	243.92	243.01		
20030221	237.50	239.75	238.00	8.70	25.79	36.08	243.11	242.92		
20030224	236.00	238.00	236.25	3.35	12.09	32.39	242.00	242.69		
20030225	236.25	239.00	238.50	9.43	7.16	40.78	241.11	242.58		
20030226	238.25	240.25	239.50	17.73	10.17	44.11	240.61	242.52		
20030227	237.75	240.00	238.25	23.40	16.85	41.01	239.97	242.31		
20030228	237.50	240.00	238.00	21.99	21.04	40.40	239.22	242.19		
20030303	238.50	240.00	238.75	19.86	21.75	43.14	238.67	242.05		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20030304	236.25	240.50	240.00	24.82	22.22	47.47	238.56	241.86		
20030305	238.75	241.50	241.25	38.07	27.58	51.45	238.72	241.75		
20030306	242.25	244.00	243.50	57.29	40.06	57.67	239.33	241.71		
20030307	242.00	244.00	243.00	75.11	56.82	55.95	240.08	241.68		
20030310	238.50	241.50	239.50	70.78	67.73	45.70	240.19	241.42		
20030311	237.00	238.25	237.75	51.04	65.64	41.60	240.00	241.06		
20030312	236.75	239.25	238.75	33.33	51.72	44.66	240.06	240.70		
20030313	238.50	239.75	239.00	31.25	38.54	45.43	240.17	240.35		
20030314	237.50	239.00	238.00	31.49	32.02	42.86	240.08	240.06		
20030317	234.00	237.25	234.25	20.86	27.87	34.90	239.44	239.60		
20030318	232.75	234.50	233.50	10.58	20.98	33.56	238.58	239.06		
20030319	232.75	235.00	234.25	7.50	12.98	36.20	237.56	238.61		
20030320	235.50	237.00	236.25	17.04	11.71	42.74	236.81	238.38		
20030321	233.75	236.50	234.25	19.26	14.60	38.49	236.22	238.12		
20030324	231.25	233.50	231.50	15.47	17.25	33.55	235.53	237.81		
20030325	230.50	232.50	231.25	6.95	13.89	33.14	234.69	237.57		
20030326	231.25	232.75	231.25	4.36	8.93	33.14	233.83	237.23		
20030327	231.75	232.75	232.25	9.01	6.77	36.77	233.19	236.88		
20030328	231.00	233.75	231.25	9.86	7.74	34.74	232.86	236.55		
20030331	237.00	241.00	240.00	38.16	19.01	57.12	233.58	236.64		
20030401	239.25	242.25	242.00	65.49	37.84	60.45	234.44	236.80		
20030402	241.00	242.75	242.25	94.76	66.14	60.86	235.11	236.90		
20030403	239.50	241.00	239.75	89.77	83.34	54.75	235.72	236.83		
20030404	239.25	240.25	239.75	82.31	88.95	54.75	236.64	236.65		
20030407	241.75	244.25	243.75	82.46	84.85	61.86	238.03	236.69		
20030408	242.25	245.25	243.50	86.67	83.81	61.21	239.39	236.88		
20030409	241.75	243.25	242.25	88.05	85.73	57.95	240.50	237.10		
20030410	239.25	242.00	239.50	76.27	83.66	51.45	241.42	237.13		
20030411	238.75	241.25	239.75	67.80	77.37	51.97	241.39	237.17		
20030414	237.25	239.50	238.00	57.62	67.23	48.04	240.94	237.17		
20030415	237.75	241.75	241.25	61.25	62.22	54.87	240.83	237.50		
20030416	238.50	241.50	238.75	58.48	59.12	49.48	240.72	237.75		
20030417	238.25	241.25	240.50	56.25	58.66	52.96	240.81	238.05		
20030421	237.75	239.00	238.25	36.44	50.39	48.35	240.19	238.14		
20030422	237.75	239.25	238.00	21.43	38.04	47.85	239.58	238.32		
20030423	236.50	238.00	237.50	11.10	22.99	46.81	239.06	238.61		
20030424	235.25	237.50	235.50	7.77	13.43	42.80	238.61	238.81		
20030425	233.25	234.75	234.00	6.73	8.53	40.03	237.97	238.94		
20030428	232.25	234.00	232.50	3.56	6.02	37.42	237.36	238.95		
20030429	231.25	233.75	233.00	7.59	5.96	38.85	236.44	239.04		
20030430	232.50	235.50	232.75	10.15	7.10	38.38	235.78	238.69		
20030501	232.00	235.25	233.25	15.86	11.20	39.95	234.97	238.27		
20030502	232.75	234.75	234.50	21.32	15.78	43.81	234.56	237.90		
20030505	236.50	240.00	239.25	42.06	26.41	55.51	234.69	237.88		
20030506	236.75	239.25	239.00	60.92	41.43	54.86	234.86	237.85		
20030507	240.00	242.50	242.00	82.45	61.81	60.78	235.58	237.76		
20030508	240.75	243.50	241.75	85.63	76.33	60.07	236.44	237.68		
20030509	241.00	251.00	249.50	91.22	86.43	71.23	238.33	238.02		
20030512	245.50	252.50	248.50	86.43	87.76	68.57	240.06	238.45		
20030513	246.00	248.00	248.00	84.14	87.26	67.21	241.75	238.85		
20030514	244.00	250.50	247.25	78.43	83.00	65.14	243.31	239.29		
20030515	247.25	251.75	251.50	83.14	81.90	70.67	245.19	239.77	251.50	
20030516	249.50	253.00	249.75	85.22	82.26	66.02	246.36	240.30		
20030519	244.25	248.00	244.50	79.96	82.77	54.46	246.97	240.49		
20030520	242.00	247.25	244.75	68.43	77.87	54.87	247.28	240.80		
20030521	244.00	247.25	245.00	60.24	69.54	55.29	247.64	241.13		
20030522	242.50	245.00	243.00	53.53	60.74	51.11	246.92	241.39		
20030523	241.25	243.25	243.00	46.12	53.30	51.11	246.31	241.75		
20030527	238.00	241.75	240.50	31.51	43.72	46.06	245.47	242.06		
20030528	239.25	242.25	240.50	23.93	33.85	46.06	244.72	242.44		
20030529	240.00	244.75	244.25	25.00	26.81	53.97	243.92	242.98		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20030530	242.75	245.75	243.50	31.67	26.87	52.32	243.22	243.49		
20030602	240.75	243.00	241.50	33.89	30.19	48.09	242.89	243.88		
20030603	239.50	241.00	239.75	23.89	29.81	44.69	242.33	244.13		
20030604	237.50	240.25	237.75	12.20	23.33	41.11	241.53	244.06		
20030605	235.50	239.25	236.50	6.33	14.14	39.00	240.81	243.94		
20030606	237.50	239.75	239.00	11.78	10.10	45.06	240.36	243.80		
20030609	235.25	237.75	236.50	14.71	10.94	40.71	239.92	243.55		
20030610	235.75	239.50	239.00	23.22	16.57	46.29	239.75	243.05		
20030611	237.50	244.25	243.25	39.29	25.74	54.19	239.64	242.80		
20030612	243.00	246.50	246.25	68.41	43.64	58.80	239.94	242.71		
20030613	241.00	247.50	241.75	75.68	61.12	50.58	239.97	242.45		
20030616	238.00	240.75	239.75	62.52	68.87	47.41	239.97	241.89		
20030617	237.00	240.25	240.00	42.86	60.35	47.85	240.22	241.43		
20030618	238.50	242.00	241.50	42.18	49.19	50.53	240.78	241.29		
20030619	240.50	244.50	241.75	47.62	44.22	50.98	241.08	241.14		
20030620	238.00	240.75	239.75	46.94	45.58	47.26	241.44	240.89		
20030623	235.25	238.25	236.50	33.33	42.63	41.92	241.17	240.58		
20030624	234.00	238.00	235.00	18.12	32.80	39.68	240.25	240.20		
20030625	235.00	236.50	235.25	8.96	20.14	40.26	239.03	239.95		
20030626	226.50	234.50	228.25	8.33	11.80	31.32	237.53	239.37		
20030627	227.75	230.50	230.00	11.42	9.57	35.19	236.44	238.69		
20030630	223.00	228.00	223.75	9.35	9.70	28.92	234.64	237.75		223.75
20030701	220.00	225.75	225.50	13.24	11.34	32.54	232.86	236.99		
20030702	223.50	226.00	223.75	12.23	11.61	30.85	230.86	236.23		
20030703	221.00	223.75	222.25	14.27	13.25	29.43	228.92	235.49		222.25
20030707	218.00	220.50	220.00	10.12	12.21	27.40	227.08	234.70		220.00
20030708	220.75	224.50	224.00	13.12	12.51	35.87	225.86	233.99		
20030709	220.00	225.25	221.50	14.47	12.57	33.26	224.33	233.27		
20030710	216.00	217.75	217.00	13.30	13.63	29.15	223.08	232.23		217.00
20030711	215.00	218.00	215.25	6.11	11.29	27.71	221.44	230.89		215.25
20030714	213.50	216.25	214.75	3.41	7.60	27.30	220.44	229.39		214.75
20030715	212.00	216.00	212.25	2.40	3.97	25.27	218.97	227.99		212.25
20030716	211.50	213.00	211.75	2.40	2.74	24.87	217.64	226.65		211.75
20030717	211.25	212.75	211.75	1.57	2.12	24.87	216.47	225.31		211.75
20030718	210.75	211.75	211.00	1.71	1.89	24.21	215.47	223.86		211.00
20030721	210.00	214.50	213.75	9.16	4.15	31.43	214.33	222.52		
20030722	212.50	215.50	213.50	15.59	8.82	31.14	213.44	221.27		
20030723	211.25	214.00	211.50	18.38	14.38	28.85	212.83	220.08		211.50
20030724	210.50	214.75	211.50	13.85	15.94	28.85	212.42	218.96		211.50
20030725	209.50	213.00	212.25	12.38	14.87	31.06	212.14	217.87		
20030728	213.50	216.00	215.25	21.27	15.83	39.20	212.47	217.25		
20030729	215.00	218.00	215.25	40.54	24.73	39.20	212.86	216.55		
20030730	213.25	215.25	213.75	51.38	37.73	36.69	213.08	216.07		
20030731	211.25	214.50	212.00	49.02	46.98	33.96	213.19	215.43		
20030801	213.00	217.00	214.00	44.12	48.17	39.51	213.22	214.96		
20030804	214.50	218.00	217.25	57.84	50.33	47.26	213.64	214.73		
20030805	215.00	217.50	217.00	77.45	59.80	46.77	214.25	214.58		
20030806	216.25	219.50	219.00	91.47	75.59	51.19	215.08	214.35		
20030807	218.75	221.50	220.25	90.94	86.62	53.77	215.97	214.29		
20030808	220.25	221.75	221.50	94.18	92.20	56.26	216.67	214.50		
20030811	217.50	223.00	218.25	84.12	89.75	48.88	217.00	214.64		
20030812	226.75	232.50	229.75	83.61	87.30	65.92	218.78	215.36		
20030813	228.50	231.00	229.50	79.94	82.55	65.41	220.72	216.18		
20030814	227.75	231.75	229.50	86.96	83.50	65.41	222.44	217.02		
20030815	227.50	229.50	229.50	86.24	84.38	65.41	223.81	217.87		
20030818	235.50	240.00	238.25	88.56	87.25	74.16	226.17	219.17	238.25	
20030819	232.25	237.50	232.50	84.57	86.46	62.90	227.67	220.06		
20030820	234.25	236.50	236.25	84.65	85.92	66.47	229.44	221.14		
20030821	230.50	239.25	232.50	76.87	82.03	60.23	230.67	222.14		
20030822	232.25	237.00	235.25	79.23	80.25	62.97	232.56	223.27		
20030825	234.50	236.50	235.50	77.55	77.88	63.22	233.19	224.38		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20030826	234.75	243.00	235.75	77.87	78.22	63.49	233.89	225.36		
20030827	233.25	237.25	237.00	76.36	77.26	64.85	234.72	226.39		
20030828	236.00	239.25	238.75	77.12	77.12	66.72	235.75	227.58		
20030829	236.50	242.00	241.75	84.04	79.18	69.69	236.14	229.00		
20030902	237.00	240.25	240.00	85.43	82.20	65.99	236.97	230.24		
20030903	240.50	244.75	244.25	90.02	86.49	70.14	237.86	231.52	244.25	
20030904	243.25	247.25	247.00	92.16	89.20	72.48	239.47	232.95	247.00	
20030905	242.50	246.75	243.00	90.15	90.78	64.55	240.33	234.10		
20030908	239.50	244.50	240.25	77.19	86.50	59.72	240.86	235.05		
20030909	240.75	243.00	242.75	68.66	78.67	62.47	241.64	236.06		
20030910	241.25	242.75	242.25	67.16	71.00	61.56	242.22	237.20		
20030911	232.50	242.00	233.00	49.43	61.75	47.76	241.58	237.36		
20030912	227.50	231.75	228.00	25.89	47.50	42.25	240.06	237.29		
20030915	225.75	228.25	227.00	4.45	26.59	41.22	238.61	237.17		
20030916	224.00	228.25	224.25	3.14	11.16	38.46	236.39	236.92		
20030917	223.50	225.50	223.75	2.65	3.41	37.96	233.81	236.23		
20030918	223.50	225.00	223.75	1.06	2.28	37.96	231.67	235.81		
20030919	222.50	227.00	226.00	5.42	3.04	41.89	230.08	235.32		
20030922	226.25	228.00	227.75	12.14	6.20	44.82	228.42	235.10		
20030923	223.50	227.00	223.75	13.47	10.34	39.87	226.36	234.55		
20030924	221.50	225.25	224.25	12.38	12.66	40.75	225.39	234.01		
20030925	225.00	228.50	226.25	12.20	12.68	44.27	225.19	233.56		
20030926	225.25	227.50	226.25	17.88	14.15	44.27	225.11	233.05		
20030929	223.75	228.25	226.00	21.31	17.13	43.89	225.31	232.44		
20030930	220.00	225.00	220.25	14.80	18.00	36.24	224.92	231.42		
20031001	218.75	221.00	220.25	11.28	15.80	36.24	224.53	230.48		
20031002	220.00	222.50	220.25	9.35	11.81	36.24	223.89	229.33		
20031003	220.00	224.50	223.00	23.50	14.71	42.25	223.36	228.19		
20031006	220.50	222.75	221.25	28.21	20.35	39.69	223.08	227.15		
20031007	220.75	224.75	223.50	39.32	30.34	44.36	223.00	226.36		
20031008	221.00	223.50	221.50	34.19	33.90	41.30	222.47	225.35		
20031009	221.00	222.25	221.75	35.90	36.47	41.84	221.97	224.37		
20031010	215.50	219.00	216.25	21.58	30.56	34.34	220.89	223.57		
20031013	215.50	218.25	217.50	17.31	24.93	37.10	220.58	223.07		
20031014	215.50	219.50	218.50	14.74	17.88	39.30	220.39	222.67		
20031015	215.75	217.50	216.50	15.43	15.83	36.55	219.97	222.30		
20031016	214.25	217.25	214.75	11.50	13.89	34.29	219.06	221.87		
20031017	214.00	217.00	214.25	4.56	10.50	33.65	218.28	221.42		
20031020	213.25	214.75	213.75	3.40	6.49	32.98	217.19	220.83		
20031021	213.50	217.25	215.75	9.45	5.80	38.23	216.56	220.26		
20031022	217.25	221.75	220.25	28.99	13.95	48.08	216.39	220.10		
20031023	225.00	238.50	235.00	56.25	31.56	66.78	218.47	220.61		
20031024	232.25	237.50	235.00	77.72	54.32	66.78	220.42	221.02		
20031027	235.00	242.75	235.25	82.28	72.08	67.01	222.28	221.45		
20031028	232.75	241.00	240.25	84.08	81.36	71.35	224.92	222.13	240.25	
20031029	239.50	250.00	248.25	87.11	84.49	76.64	228.64	223.46	248.25	
20031030	246.00	251.00	247.75	92.72	87.97	75.70	232.36	224.77	247.75	
20031031	243.00	247.75	247.25	92.23	90.69	74.71	236.08	226.06	247.25	
20031103	239.50	246.00	240.00	84.11	89.69	62.06	238.78	226.87		
20031104	231.50	239.25	232.25	70.42	82.25	51.94	240.11	227.39		
20031105	230.25	238.00	236.75	61.15	71.89	56.39	240.31	228.02		
20031106	234.00	239.00	234.25	56.07	62.55	53.43	240.22	228.63		
20031107	231.50	237.75	235.25	58.63	58.62	54.46	240.22	229.27		
20031110	232.25	235.25	232.75	53.19	55.96	51.40	239.39	230.06		
20031111	231.00	234.25	232.50	44.26	52.02	51.09	237.64	230.77		
20031112	234.25	241.50	240.25	40.99	46.14	59.27	236.81	231.81		
20031113	239.00	244.25	240.75	42.55	42.60	59.73	236.08	232.96		
20031114	239.25	242.00	240.50	49.40	44.31	59.37	236.14	234.19		
20031117	236.50	241.00	238.25	46.18	46.04	56.03	236.81	235.33		
20031118	234.50	239.00	235.75	38.15	44.58	52.50	236.69	236.38		
20031119	231.00	235.00	231.25	23.59	35.98	46.78	236.36	237.12		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20031120	230.50	235.50	235.25	21.32	27.69	51.81	236.36	237.83		
20031121	232.75	237.00	236.00	26.18	23.70	52.71	236.72	237.88		
20031124	233.75	236.25	234.75	34.99	27.50	51.00	236.97	237.87		
20031125	233.25	240.00	239.50	46.22	35.80	56.74	236.89	238.07		
20031126	240.25	243.25	242.50	61.62	47.61	59.94	237.08	238.18		
20031128	242.75	245.50	245.00	83.13	63.66	62.43	237.58	238.02		
20031201	244.50	247.50	246.50	92.69	79.15	63.88	238.50	237.96		
20031202	244.25	247.00	245.75	93.50	89.77	62.58	239.61	237.89		
20031203	246.00	250.00	249.25	93.33	93.17	66.06	241.61	238.33		
20031204	246.50	250.75	246.75	88.70	91.84	61.65	242.89	239.02		
20031205	243.75	247.00	246.50	85.14	89.06	61.21	244.06	239.49		
20031208	245.50	249.00	246.75	79.84	84.56	61.51	245.39	240.08		
20031209	247.00	250.00	249.75	84.77	83.25	64.96	246.53	240.77		
20031210	248.50	250.75	249.75	90.12	84.91	64.96	247.33	241.58		
20031211	247.00	253.00	252.00	95.06	89.99	67.49	248.11	242.51		
20031212	251.00	255.00	254.75	96.32	93.84	70.32	249.03	243.20	254.75	
20021213	235.50	238.75	235.50	30.38	25.86	39.89	235.39	240.23		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2004

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20031203	247.25	249.50	249.25							
20031204	248.25	250.00	248.50							
20031205	246.00	248.50	247.50							
20031208	246.75	248.50	247.00							
20031209	247.00	249.00	248.50							
20031210	248.25	249.50	249.00							
20031211	247.00	249.00	248.75							
20031212	249.00	250.00	249.50							
20031215	248.00	250.00	249.50				248.61			
20031216	247.25	249.75	248.50				248.53			
20031217	248.00	249.75	248.50				248.53			
20031218	248.00	249.00	248.25				248.61			
20031219	247.25	249.75	248.50				248.78			
20031222	247.75	249.25	248.25				248.75			
20031223	247.25	248.50	247.75				248.61			
20031224	240.50	244.00	243.50	43.86		27.27	248.03			
20031226	240.50	247.25	247.00	47.92		45.83	247.75			
20031229	247.00	250.00	247.75	58.77	50.18	48.85	247.56			
20031230	246.25	247.75	246.50	69.30	58.66	44.41	247.33			
20031231	246.50	249.00	248.75	75.44	67.84	52.73	247.36			
20040102	249.25	254.25	253.50	81.52	75.42	64.73	247.94	248.30		
20040105	250.75	254.50	253.00	90.22	82.39	62.92	248.44	248.48		
20040106	252.75	254.50	253.50	92.23	87.99	64.00	249.03	248.71		
20040107	251.50	253.00	252.00	88.10	90.18	58.48	249.50	248.93		
20040108	251.50	253.50	253.25	88.69	89.67	61.46	250.58	249.23		
20040109	252.25	253.75	252.75	86.90	87.90	59.62	251.22	249.43		
20040112	259.00	262.50	260.25	89.45	88.35	72.81	252.61	249.96	260.25	
20040113	260.50	266.00	265.00	91.12	89.16	77.76	254.67	250.74	265.00	
20040114	262.75	268.75	267.75	94.10	91.56	80.03	256.78	251.61	267.75	
20040115	267.50	270.00	268.75	96.10	93.77	80.80	258.47	252.52	268.75	
20040116	266.50	272.00	271.00	96.11	95.44	82.44	260.47	253.60	271.00	
20040120	270.75	275.00	273.25	95.26	95.83	83.91	262.67	254.77	273.25	
20040121	271.00	275.25	274.50	95.81	95.73	84.68	265.17	256.02	274.50	
20040122	271.25	274.50	272.50	93.58	94.88	78.23	267.31	257.17	272.50	
20040123	270.50	275.25	273.75	93.56	94.32	79.29	269.64	258.38	273.75	
20040126	275.00	278.50	277.75	93.51	93.55	82.27	271.58	259.81	277.75	
20040127	274.00	278.75	274.25	91.53	92.87	72.45	272.61	261.27	274.25	
20040128	267.25	272.00	268.00	80.42	88.49	58.92	272.64	262.27		
20040129	266.50	270.00	267.50	67.19	79.71	57.99	272.50	263.21		
20040130	268.75	275.00	274.00	64.68	70.77	65.61	272.83	264.52		
20040202	266.25	271.00	269.50	60.94	64.27	57.79	272.42	265.51		
20040203	269.75	273.75	270.75	58.42	61.35	59.24	272.00	266.33		
20040204	268.50	273.00	270.00	43.11	54.15	57.96	271.72	267.14		
20040205	269.00	277.50	276.00	52.67	51.40	64.59	271.97	268.21		
20040206	276.75	279.00	278.50	68.03	54.60	66.93	272.06	269.48		
20040209	273.50	284.50	283.50	89.53	70.08	71.06	273.08	270.92	283.50	
20040210	279.50	286.00	280.25	87.16	81.57	65.35	274.44	272.23		
20040211	278.50	284.75	283.75	84.67	87.12	68.30	276.25	273.35		
20040212	278.50	284.50	282.00	79.75	83.86	65.31	277.14	274.15		
20040213	277.50	282.25	281.25	81.43	81.95	64.01	278.44	274.80		
20040217	281.75	284.75	283.00	80.17	80.45	65.72	279.81	275.48		
20040218	279.75	283.50	280.50	77.64	79.75	61.25	280.97	275.93		
20040219	279.75	284.00	283.50	81.43	79.75	64.38	281.81	276.42		
20040220	282.00	285.75	284.75	84.39	81.15	65.63	282.50	276.90		
20040223	285.00	290.00	288.25	90.96	85.59	68.91	283.03	277.65		
20040224	285.50	292.50	292.25	94.83	90.06	72.18	284.36	278.54	292.25	
20040225	290.00	294.25	292.25	94.30	93.36	72.18	285.31	279.23	292.25	
20040226	289.50	295.00	294.50	96.24	95.12	73.97	286.69	280.19	294.50	
20040227	292.75	297.25	295.50	94.13	94.89	74.74	288.28	281.50	295.50	
20040301	294.00	297.00	296.50	95.50	95.29	75.53	289.78	282.88	296.50	
20040302	291.50	299.75	292.00	84.67	91.43	65.63	291.06	283.74		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20040303	289.00	293.75	293.25	77.39	85.85	66.93	292.14	284.87		
20040304	289.75	293.00	292.00	67.04	76.36	64.32	292.94	285.88		
20040305	289.00	294.00	291.50	64.90	69.78	63.25	293.31	286.90		
20040308	285.50	289.00	287.25	53.81	61.92	54.94	292.75	287.44		
20040309	288.00	295.50	295.00	57.50	58.74	64.18	293.06	288.23		
20040310	290.75	297.25	291.75	56.23	55.84	58.74	292.75	288.62		
20040311	291.25	295.50	292.25	60.11	57.95	59.31	292.39	289.19		
20040312	292.25	295.00	294.75	56.33	57.56	62.14	292.19	289.71		
20040315	296.75	300.50	300.00	70.24	62.23	67.28	293.08	290.57		
20040316	297.50	300.50	298.50	82.75	69.77	64.58	293.67	291.39		
20040317	296.25	301.00	300.00	92.29	81.76	66.05	294.56	292.20		
20040318	302.25	307.00	305.25	90.69	88.58	70.63	296.08	293.38	305.25	
20040319	304.00	311.00	307.50	90.56	91.18	72.35	298.33	294.52	307.50	
20040322	312.25	317.00	316.50	92.18	91.15	77.92	300.72	296.04	316.50	
20040323	312.50	316.00	314.75	92.51	91.75	74.77	303.28	297.30	314.75	
20040324	307.50	317.00	308.75	88.36	91.02	65.04	305.11	298.08		
20040325	302.00	310.75	302.50	73.54	84.81	56.76	305.97	298.57		
20040326	299.25	305.00	301.75	58.40	73.43	55.84	306.17	298.92		
20040329	297.25	301.25	300.75	46.49	59.48	54.57	306.42	299.17		
20040330	301.25	307.50	306.75	48.57	51.15	60.38	307.17	299.65		
20040331	311.50	322.00	317.75	61.33	52.13	68.38	308.56	300.88		
20040401	321.50	331.50	326.50	77.24	62.38	73.04	310.67	302.46		
20040402	326.50	335.50	334.25	89.45	76.01	76.36	312.64	304.48	334.25	
20040405	334.00	340.00	335.25	90.59	85.76	76.76	314.92	306.56	335.25	
20040406	331.00	335.00	332.25	89.28	89.77	72.80	317.53	308.70	332.25	
20040407	333.50	338.50	336.50	87.61	89.16	74.78	321.31	310.68	336.50	
20040408	335.00	341.50	336.50	87.46	88.12	74.78	325.17	312.81	336.50	
20040412	326.25	331.00	326.50	82.21	85.76	62.37	328.03	314.44		
20040413	312.00	325.00	314.00	64.22	77.96	50.97	328.83	315.36		
20040414	311.50	321.00	319.50	51.41	65.95	54.88	329.03	316.29		
20040415	299.50	321.00	304.50	34.84	50.16	44.47	326.58	316.57		
20040416	305.00	314.50	311.00	32.58	39.61	48.99	324.00	317.10		
20040419	308.00	313.00	310.25	24.35	30.59	48.50	321.22	317.33		
20040420	306.25	310.00	307.50	25.24	27.39	46.65	318.47	317.33		
20040421	297.50	305.75	302.00	18.29	22.63	43.12	314.64	316.64		
20040422	302.50	305.50	304.50	15.06	19.53	45.16	311.08	316.15		
20040423	301.75	307.50	305.50	14.77	16.04	45.99	308.75	316.00		
20040426	298.00	304.00	303.00	15.53	15.12	44.18	307.53	316.02		
20040427	304.00	315.75	312.00	21.21	17.17	51.54	306.69	316.51		
20040428	306.00	311.00	310.00	24.62	20.45	49.97	307.31	316.95		
20040429	308.25	315.25	313.50	36.37	27.40	52.70	307.58	317.27		
20040430	315.25	322.75	317.25	49.33	36.78	55.49	308.36	317.25		
20040503	316.50	321.75	319.75	69.23	51.65	57.31	309.72	316.93		
20040504	317.00	322.25	320.00	83.02	67.19	57.50	311.72	316.25		
20040505	313.00	318.75	315.25	82.51	78.25	52.78	312.92	315.30		
20040506	303.00	312.00	303.75	61.39	75.64	43.47	312.72	313.94		
20040507	298.00	306.50	304.75	41.25	61.72	44.39	312.92	312.43		
20040510	290.50	296.50	292.00	19.37	40.67	36.30	310.69	310.31		
20040511	289.50	294.00	293.50	15.13	25.25	37.74	308.86	308.74		
20040512	286.00	297.50	290.75	9.87	14.79	36.13	306.33	307.63		
20040513	286.00	291.75	289.50	11.49	12.16	35.39	303.25	306.20		
20040514	283.25	287.50	285.00	8.96	10.11	32.79	299.39	305.27		
20040517	280.25	288.50	288.00	10.73	10.39	36.15	295.83	304.18		
20040518	281.25	287.25	283.25	9.91	9.87	33.31	292.28	302.89		
20040519	284.50	290.00	289.75	15.88	12.17	40.24	290.72	302.05		
20040520	279.50	288.50	282.50	12.14	12.64	35.77	288.25	301.12		
20040521	278.00	284.00	281.00	12.05	13.36	34.91	287.03	300.00		
20040524	283.25	289.50	289.25	13.80	12.66	43.05	286.56	299.23		
20040525	293.50	297.00	296.50	29.60	18.48	49.08	287.19	298.92		
20040526	292.50	298.00	293.50	45.47	29.62	46.87	287.64	298.04		
20040527	289.50	298.00	291.25	58.35	44.47	45.22	288.33	297.14		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20040528	290.00	299.75	297.25	69.71	57.84	50.24	289.36	296.37		
20040601	313.00	317.25	317.25	84.92	70.99	62.55	293.14	296.37		
20040602	316.50	322.00	319.25	94.09	82.91	63.53	296.42	296.35		
20040603	309.00	314.50	310.00	88.83	89.28	56.25	299.47	295.87		
20040604	308.50	314.00	310.75	80.30	87.74	56.69	302.78	295.65		
20040607	297.00	305.00	303.50	68.37	79.17	51.39	304.36	295.64		
20040608	298.50	302.75	299.25	60.23	69.63	48.53	304.67	295.38		
20040609	297.75	303.00	302.50	53.98	60.86	50.79	305.67	295.88		
20040610	289.50	298.00	290.75	44.32	52.84	43.38	305.61	295.75		
20040614	290.00	296.50	294.50	37.90	45.40	46.08	305.31	295.93		
20040615	284.00	290.50	284.25	19.56	33.92	40.41	301.64	295.68		
20040616	284.00	289.00	286.25	11.87	23.11	41.91	297.97	295.74		
20040617	280.25	288.50	283.25	4.59	12.00	40.27	295.00	295.51		
20040618	279.50	286.00	280.00	4.76	7.07	38.51	291.58	295.36		
20040621	276.00	283.75	282.25	7.32	5.56	40.45	289.22	295.00		
20040622	276.50	281.75	277.25	5.83	5.97	37.61	286.78	294.75		
20040623	276.00	284.75	284.25	12.58	8.57	43.58	284.75	294.90		
20040624	280.50	285.50	282.50	13.75	10.72	42.49	283.83	294.58		
20040625	282.25	286.00	285.50	23.76	16.70	45.04	282.83	294.06		
20040628	277.50	281.50	279.00	20.32	19.28	40.81	282.25	293.37		
20040629	276.25	282.25	277.50	16.48	20.19	39.89	281.28	292.71		
20040630	264.75	271.00	267.00	7.81	14.87	34.04	279.47	291.27		
20040701	262.50	268.25	267.25	8.76	11.02	34.29	278.06	288.89		
20040702	262.25	265.25	263.00	7.80	8.12	32.09	275.92	286.21		
20040706	256.75	261.50	258.50	7.35	7.97	29.91	273.83	283.76		258.50
20040707	257.50	261.75	258.50	4.53	6.56	29.91	270.97	281.27		258.50
20040708	252.75	256.75	253.75	4.65	5.51	27.60	267.78	278.90		253.75
20040709	251.75	253.75	252.25	3.33	4.17	26.90	264.08	276.67		252.25
20040712	249.00	254.75	254.25	6.22	4.73	29.48	261.33	274.37		254.25
20040713	251.25	254.25	251.75	7.69	5.75	28.14	258.47	272.51		251.75
20040714	251.00	256.00	254.00	11.71	8.54	31.17	257.03	270.58		
20040715	249.75	253.00	250.25	8.11	9.17	28.98	255.14	268.96		250.25
20040716	247.00	249.25	247.50	6.10	8.64	27.46	253.42	267.12		247.50
20040719	243.50	246.25	245.00	2.89	5.70	26.11	251.92	265.30		245.00
20040720	240.75	246.00	242.00	3.14	4.04	24.56	250.08	263.49		242.00
20040721	233.75	239.75	234.50	3.39	3.14	21.16	247.94	261.21		234.50
20040722	227.50	234.25	227.75	2.32	2.95	18.66	245.22	258.86		227.75
20040723	230.50	233.50	232.00	5.32	3.68	24.69	242.75	256.37		232.00
20040726	226.25	231.75	231.75	9.76	5.80	24.58	240.53	253.95		231.75
20040727	229.00	232.25	230.75	14.46	9.85	24.09	237.94	251.35		230.75
20040728	225.50	230.75	226.75	11.45	11.89	22.21	235.33	248.86		226.75
20040729	226.50	231.50	227.00	7.92	11.28	22.61	233.06	246.45		227.00
20040730	225.00	230.50	225.50	3.54	7.64	21.87	230.89	244.48		225.50
20040802	225.00	228.75	227.75	5.13	5.53	25.80	229.31	242.60		227.75
20040803	225.75	229.00	228.75	7.96	5.55	27.55	228.67	240.96		228.75
20040804	227.25	232.25	231.25	16.01	9.70	31.86	229.06	239.67		
20040805	230.00	235.25	234.75	28.35	17.44	37.47	229.36	238.54		
20040806	234.00	237.00	236.75	42.54	28.97	40.49	229.92	237.73		
20040809	236.00	239.00	238.00	63.32	44.74	42.36	230.72	237.05		
20040810	234.25	238.00	235.75	73.62	59.83	39.93	231.72	236.17		
20040811	231.25	236.75	232.00	71.64	69.53	36.19	232.28	235.23		
20040812	226.00	230.25	229.00	51.79	65.68	33.50	232.67	234.04		
20040813	226.25	229.25	228.25	33.93	52.45	32.84	232.72	232.99		
20040816	225.25	233.25	233.00	36.31	40.67	40.78	233.19	232.30		
20040817	234.75	241.50	239.75	56.58	42.27	49.86	234.14	232.05		
20040818	235.25	239.25	236.25	71.57	54.82	45.93	234.31	231.77		
20040819	236.25	240.75	240.25	83.33	70.50	50.71	234.69	232.05		
20040820	237.25	242.00	241.75	86.37	80.43	52.41	235.11	232.71		
20040823	240.00	245.25	244.25	95.31	88.34	55.19	236.06	233.30		
20040824	240.50	243.75	242.00	92.42	91.37	52.24	237.17	233.79		
20040825	235.50	244.75	237.00	79.17	88.97	46.31	238.06	234.08		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20040826	233.50	236.75	234.00	62.08	77.89	43.14	238.69	234.43		
20040827	228.50	234.75	229.00	40.42	60.56	38.43	238.25	234.52		
20040830	231.50	239.00	235.25	37.50	46.67	46.32	237.75	234.99		
20040831	233.25	238.00	237.75	43.75	40.56	49.13	237.92	235.46		
20040901	237.75	245.00	242.75	66.67	49.31	54.29	238.19	236.13		
20040902	235.50	239.50	236.25	68.33	59.58	47.54	237.58	236.37		
20040903	230.50	233.50	231.00	52.48	62.49	42.91	236.11	236.19		
20040907	225.00	228.75	226.50	25.78	48.86	39.37	234.39	235.70		
20040908	225.25	228.00	226.75	10.32	29.53	39.66	233.25	235.17		
20040909	226.00	227.25	226.50	7.82	14.64	39.45	232.42	234.73		
20040910	220.75	224.25	222.25	7.39	8.51	35.99	231.67	234.26		
20040913	218.75	221.25	220.50	6.73	7.31	34.63	230.03	233.86		
20040914	217.75	221.00	218.00	4.57	6.23	32.74	227.83	233.37		
20040915	217.25	220.00	218.50	4.03	5.11	33.53	225.14	232.68		
20040916	216.00	219.75	216.25	2.09	3.56	31.74	222.92	231.56		
20040917	215.00	217.50	215.25	2.07	2.73	30.95	221.17	230.56		
20040920	212.50	215.00	212.75	0.82	1.66	29.01	219.64	229.25		212.75
20040921	212.25	214.00	212.75	1.04	1.31	29.01	218.08	227.87		212.75
20040922	210.00	213.25	210.25	1.05	0.97	27.04	216.28	226.25		210.25
20040923	207.00	210.50	207.75	1.73	1.28	25.20	214.67	224.62		207.75
20040924	205.00	207.50	205.25	1.58	1.45	23.47	212.97	223.11		205.25
20040927	204.75	211.00	207.75	5.60	2.97	28.72	211.83	221.86		207.75
20040928	206.50	209.75	208.50	10.21	5.79	30.26	210.72	220.88		
20040929	206.75	210.25	207.25	14.13	9.98	29.13	209.72	219.55		207.25
20040930	204.00	206.75	205.50	12.73	12.36	27.58	208.64	218.01		205.50
20041001	205.50	207.25	206.00	11.09	12.65	28.75	207.89	216.26		206.00
20041004	202.50	204.50	202.75	7.30	10.37	25.82	206.78	214.67		202.75
20041005	202.50	206.00	204.50	8.26	8.88	29.95	206.14	213.40		204.50
20041006	203.25	209.00	207.25	14.90	10.15	35.99	206.08	212.49		
20041007	205.75	209.50	206.00	23.75	15.64	34.53	206.17	211.50		
20041008	204.25	206.00	204.50	25.69	21.45	32.82	205.81	210.45		
20041011	204.25	206.25	204.75	22.11	23.85	33.41	205.39	209.62		
20041012	197.00	204.50	202.50	25.87	24.55	30.77	204.86	208.76		
20041013	202.25	205.75	205.25	39.71	29.23	37.29	204.83	208.15		
20041014	203.00	207.25	204.25	50.00	38.53	35.96	204.64	207.48		
20041015	204.25	207.50	206.75	61.43	50.38	41.55	205.08	207.02		
20041018	203.75	206.50	204.00	59.40	56.94	37.66	205.03	206.49		
20041019	202.75	208.00	207.00	68.81	63.21	43.84	205.00	206.21		
20041020	205.50	209.50	206.00	68.28	65.49	42.33	205.00	205.89		
20041021	204.00	208.75	204.25	70.00	69.03	39.76	204.97	205.61		
20041022	201.50	204.00	201.75	56.00	64.76	36.35	204.64	205.32		
20041025	201.75	206.50	205.25	54.00	60.00	43.63	204.94	205.32		
20041026	203.75	207.75	206.75	60.67	56.89	46.46	205.11	205.27		
20041027	205.50	208.00	206.25	72.67	62.44	45.63	205.33	205.17		
20041028	205.25	207.25	206.25	75.33	69.56	45.63	205.28	205.12		
20041029	201.50	207.50	202.50	64.00	70.67	39.55	205.11	204.98		
20041101	199.25	202.50	200.00	41.77	60.37	36.10	204.33	204.69		
20041102	199.25	201.50	199.75	18.73	41.50	35.76	203.64	204.55		
20041103	198.75	201.00	199.00	4.84	21.78	34.72	203.06	204.29		
20041104	197.25	199.25	197.50	3.08	8.88	32.66	202.58	203.82		
20041105	197.25	200.75	199.50	7.58	5.17	37.94	201.94	203.51		
20041108	197.50	199.25	198.00	8.84	6.50	35.68	200.97	203.20		
20041109	197.75	199.00	198.00	10.34	8.92	35.68	200.06	202.88		
20041110	198.00	204.00	198.25	7.32	8.83	36.41	199.17	202.68		
20041111	197.00	198.50	197.25	6.03	7.89	34.71	198.58	202.30		
20041112	195.50	201.00	200.00	15.86	9.74	42.65	198.58	202.10		
20041115	202.00	205.00	202.50	31.42	17.77	48.74	198.89	201.89		
20041116	201.50	204.00	203.00	51.50	32.93	49.89	199.33	201.85		
20041117	204.75	208.50	205.75	65.78	49.57	55.76	200.25	201.79		
20041118	202.75	204.75	204.00	68.91	62.06	51.62	200.75	201.69		
20041119	199.00	203.75	199.25	57.69	64.13	42.41	200.89	201.45		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20041122	197.25	200.25	197.50	36.54	54.38	39.61	200.83	201.25		
20041123	197.50	198.75	198.00	21.15	38.46	40.81	200.81	200.90		
20041124	197.50	198.75	197.75	17.31	25.00	40.38	200.86	200.48		
20041126	196.50	198.75	197.00	16.03	18.16	39.04	200.53	200.04		
20041129	192.50	196.50	193.25	11.18	14.84	33.12	199.50	199.42		
20041130	192.25	194.00	192.50	5.92	11.04	32.07	198.33	198.94		
20041201	191.25	194.25	191.50	2.56	6.55	30.68	196.75	198.54		
20041202	191.00	193.00	192.50	3.85	4.11	33.78	195.47	198.19		
20041203	193.75	196.50	196.25	13.34	6.58	43.90	195.14	198.06		
20041206	197.50	198.75	197.75	25.71	14.30	47.36	195.17	198.07		
20041207	192.00	198.25	193.75	28.10	22.38	40.23	194.69	197.80		
20041208	192.75	204.25	195.50	29.00	27.60	44.19	194.44	197.68		
20041209	194.00	196.50	194.75	25.58	27.56	42.88	194.19	197.52		
20041210	193.25	196.25	193.50	26.63	27.07	40.71	194.22	197.30		
20041213	195.50	197.75	197.25	31.45	27.89	49.04	194.75	197.30		
20041214	194.00	197.00	195.00	32.08	30.05	44.96	195.14	197.06		
20021213	235.50	238.75	235.50	30.38	25.86	39.89	235.39	240.23		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2005

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20041202	235.00	237.25	235.75							
20041203	236.25	238.25	238.00							
20041206	238.75	240.00	239.25							
20041207	235.00	239.00	236.00							
20041208	235.00	236.75	236.00							
20041209	234.75	235.75	235.00							
20041210	233.00	235.50	233.25							
20041213	234.50	237.00	236.75							
20041214	236.00	238.25	238.00				236.44			
20041215	236.50	239.25	237.25				236.61			
20041216	235.00	237.50	236.50				236.44			
20041217	235.00	236.75	236.50				236.14			
20041220	237.50	239.50	238.00				236.36			
20041221	236.75	237.75	237.50				236.53			
20041222	236.50	238.00	237.50				236.81			
20041223	237.75	239.00	238.75	70.24		52.24	237.42			
20041227	237.75	239.75	239.50	80.91		54.44	237.72			
20041228	237.75	238.50	238.50	86.64	79.26	51.06	237.78			
20041229	235.50	238.25	235.75	72.84	80.13	43.15	237.61			
20041230	234.50	237.00	236.75	59.26	72.91	46.40	237.64			
20050103	233.50	234.75	234.00	34.77	55.62	39.67	237.36	236.88		
20050104	232.75	233.75	233.00	22.38	38.80	37.54	236.81	236.75		
20050105	233.00	234.50	233.25	6.24	21.13	38.43	236.33	236.52		
20050106	234.00	238.25	238.00	28.57	19.06	52.34	236.39	236.46		
20050107	236.50	240.00	237.25	48.07	27.63	50.40	236.22	236.52		
20050110	235.50	237.25	237.25	66.38	47.67	50.40	235.97	236.58		
20050111	236.25	237.75	237.25	62.07	58.84	50.40	235.83	236.69		
20050112	232.00	234.50	232.50	43.46	57.30	38.99	235.47	236.65		
20050113	230.00	232.00	231.50	27.77	44.43	37.09	234.89	236.40		
20050114	228.00	230.50	228.50	8.47	26.57	32.04	234.28	235.95		
20050118	226.75	228.25	227.00	7.02	14.42	29.85	233.61	235.46		227.00
20050119	227.25	228.00	227.25	3.28	6.26	30.70	232.94	235.02		
20050120	227.25	229.00	228.50	6.29	5.53	34.94	231.89	234.64		
20050121	227.75	229.00	228.50	10.06	6.54	34.94	230.92	234.19		
20050124	228.75	230.50	229.00	14.47	10.27	36.74	230.00	233.79		
20050125	228.25	230.75	230.25	18.87	14.47	41.12	229.22	233.44		
20050126	230.25	232.00	230.25	23.27	18.87	41.12	228.97	233.04		
20050127	227.50	229.25	228.00	20.75	20.96	35.93	228.58	232.49		
20050128	227.50	228.50	227.75	14.98	19.67	35.39	228.50	231.98		
20050131	227.25	229.50	228.75	12.24	15.99	39.29	228.69	231.64		
20050201	229.00	230.00	229.25	19.84	15.69	41.19	228.92	231.29		
20050202	227.50	228.50	227.75	23.16	18.41	37.40	228.83	230.99		
20050203	227.00	228.25	228.00	25.04	22.68	38.42	228.78	230.75		
20050204	227.00	228.00	227.50	19.05	22.42	37.12	228.61	230.48		
20050207	227.50	229.25	228.50	22.70	22.26	41.39	228.42	230.02		
20050208	227.00	228.75	227.25	16.43	19.39	37.92	228.08	229.55		
20050209	226.75	227.75	227.25	14.84	17.99	37.92	228.00	229.07		
20050210	228.50	231.00	230.25	27.06	19.44	49.67	228.28	228.74		
20050211	228.50	231.00	230.25	47.62	29.84	49.67	228.44	228.63		
20050214	230.00	232.00	231.50	74.60	49.76	53.88	228.69	228.63		
20050215	230.25	231.50	231.00	79.37	67.20	52.01	229.06	228.75		
20050216	228.50	230.00	229.00	71.43	75.13	45.22	229.17	228.85		
20050217	230.00	231.75	231.00	68.25	73.02	51.97	229.56	229.02		
20050218	230.75	232.75	231.50	67.66	69.11	53.51	229.89	229.17		
20050222	234.00	239.50	237.00	80.17	72.03	66.32	230.97	229.57		
20050223	234.75	236.00	235.50	76.06	74.63	61.35	231.89	229.88		
20050224	234.75	236.75	236.00	73.86	76.70	62.37	232.53	230.15		
20050225	236.00	246.00	238.50	67.41	72.44	67.01	233.44	230.55		
20050228	239.00	242.50	242.00	70.94	70.73	72.19	234.61	231.21	242.00	
20050301	239.25	241.75	240.00	69.70	69.35	65.83	235.61	231.80		
20050302	239.00	244.00	240.00	71.26	70.63	65.83	236.83	232.33		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20050303	237.50	239.75	239.25	65.32	68.76	63.40	237.75	232.81		
20050304	237.50	240.00	238.25	60.95	65.84	60.21	238.50	233.31		
20050307	234.50	238.25	234.75	50.95	59.08	50.61	238.25	233.63		
20050308	233.00	236.75	235.25	43.33	51.75	51.80	238.22	234.00		
20050309	234.50	239.50	238.50	42.47	45.59	58.71	238.50	234.48		
20050310	236.50	242.50	241.50	54.06	46.62	63.87	238.83	235.15		
20050311	241.00	246.00	245.00	71.97	56.17	68.77	239.17	236.00		
20050314	241.75	244.00	242.75	79.27	68.43	62.87	239.47	236.60		
20050315	244.25	249.50	247.50	85.06	78.77	68.93	240.31	237.42		
20050316	245.75	249.00	246.75	82.07	82.13	67.07	241.14	238.14		
20050317	243.00	245.75	245.00	81.31	82.82	62.80	241.89	238.81		
20050318	241.75	244.00	243.00	72.22	78.54	58.25	242.81	239.48		
20050321	236.25	240.00	238.50	55.56	69.70	49.54	243.17	239.83		
20050322	237.00	240.00	237.50	40.40	56.06	47.83	243.06	240.12		
20050323	232.50	235.00	234.25	23.63	39.86	42.67	242.25	239.99		
20050324	232.75	234.00	233.75	14.97	26.34	41.92	241.00	239.90		
20050328	232.50	235.75	234.75	10.29	16.30	44.04	240.11	239.85		
20050329	234.00	235.75	234.50	10.78	12.02	43.61	238.67	239.65		
20050330	234.00	236.25	234.25	11.76	10.95	43.16	237.28	239.29		
20050331	234.50	240.25	234.75	11.76	11.44	44.40	236.14	239.04		
20050401	233.00	238.50	237.00	16.67	13.40	49.71	235.47	238.89		
20050404	234.00	235.50	235.00	18.14	15.52	45.54	235.08	238.69		
20050405	230.00	233.50	230.50	14.60	16.47	37.85	234.31	238.32		
20050406	231.00	232.25	231.50	8.95	13.90	40.27	234.00	238.17		
20050407	230.00	231.50	230.50	5.24	9.60	38.65	233.64	237.94		
20050408	228.25	230.25	229.50	7.84	7.34	37.05	233.06	237.51		
20050411	228.25	231.00	230.75	11.61	8.23	40.38	232.64	237.00		
20050412	230.00	232.25	231.00	18.06	12.50	41.05	232.28	236.33		
20050413	228.25	230.50	230.25	20.14	16.60	39.61	231.78	235.74		
20050414	230.25	233.00	231.50	22.22	20.14	43.18	231.17	234.98		
20050415	229.25	232.00	230.25	20.14	20.83	40.59	230.64	234.19		
20050418	227.75	230.00	228.50	16.58	19.65	37.23	230.42	233.40		
20050419	228.75	234.00	233.00	21.56	19.43	48.95	230.58	232.93		
20050420	233.25	235.00	234.75	37.71	25.28	52.65	231.06	232.75		
20050421	233.25	236.25	235.75	67.08	42.11	54.68	231.75	232.67		
20050422	233.50	235.75	234.00	77.59	60.79	50.60	232.11	232.65		
20050425	236.75	240.00	237.25	81.73	75.47	57.01	232.81	232.82		
20050426	236.25	238.25	237.75	77.57	78.96	57.91	233.64	232.96		
20050427	233.25	238.25	234.25	70.75	76.68	49.99	233.94	232.95		
20050428	229.75	234.25	230.25	51.70	66.67	42.78	233.94	232.76		
20050429	229.75	232.25	230.75	32.65	51.70	43.87	234.19	232.57		
20050502	226.25	227.75	226.50	15.57	33.31	37.36	233.47	232.07		
20050503	222.50	226.50	223.00	9.72	19.32	33.01	232.17	231.50		
20050504	223.50	225.50	223.75	3.94	9.74	34.76	230.83	231.18		
20050505	223.00	225.75	225.50	9.05	7.57	38.78	229.89	230.89		
20050506	223.75	226.75	226.00	14.76	9.25	39.92	228.64	230.68		
20050509	224.50	227.75	225.75	18.57	14.13	39.53	227.31	230.50		
20050510	225.50	227.75	225.75	19.05	17.46	39.53	226.36	230.26		
20050511	223.50	224.75	224.25	15.71	17.78	36.97	225.69	229.94		
20050512	220.75	223.25	222.25	12.12	15.63	33.84	224.75	229.56		
20050513	221.25	222.75	221.75	7.84	11.89	33.08	224.22	229.10		
20050516	224.00	225.75	225.25	13.07	11.01	42.73	224.47	228.86		
20050517	223.75	225.75	225.50	22.20	14.37	43.35	224.67	228.71		
20050518	226.50	231.00	228.75	43.49	26.26	50.89	225.03	228.51		
20050519	227.50	229.50	227.75	57.68	41.12	48.74	225.22	228.18		
20050520	229.50	232.25	231.00	75.66	58.94	55.34	225.81	227.95		
20050523	236.00	241.00	240.50	84.98	72.78	68.23	227.44	228.26		
20050524	237.00	239.00	238.25	91.03	83.89	63.55	229.00	228.31		
20050525	235.75	244.00	239.75	88.56	88.19	65.26	230.94	228.40		
20050526	237.75	242.00	241.75	86.15	88.58	67.45	233.17	228.76		
20050527	237.50	240.25	238.75	83.15	85.96	61.21	234.67	229.17		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20050531	237.25	245.00	239.25	81.34	83.55	61.85	236.19	229.57		
20050601	238.25	242.50	241.75	80.10	81.53	64.93	237.64	230.30		
20050602	234.00	238.00	235.00	73.59	78.35	52.57	238.44	230.87		
20050603	234.50	237.00	236.25	67.77	73.82	54.31	239.03	231.46		
20050606	238.25	243.25	238.50	62.04	67.80	57.33	238.81	232.08		
20050607	237.00	240.75	238.25	63.92	64.58	56.88	238.81	232.67		
20050608	233.25	237.25	234.75	58.12	61.36	50.86	238.25	233.10		
20050609	231.25	235.50	234.50	45.73	55.92	50.45	237.44	233.51		
20050610	229.25	236.25	230.25	26.68	43.51	43.94	236.50	233.80		
20050613	233.00	237.00	234.75	24.51	32.31	51.13	236.00	234.39		
20050614	233.00	239.50	238.75	33.86	28.35	56.47	235.67	235.20		
20050615	242.00	246.50	244.50	61.21	39.86	62.76	236.72	236.12		
20050616	243.00	247.00	245.50	80.09	58.39	63.75	237.75	237.07		
20050617	246.00	249.25	249.00	92.90	78.07	67.03	238.92	238.04		
20050620	252.25	256.75	255.75	95.55	89.52	72.24	240.86	239.37	255.75	
20050621	251.50	255.00	252.25	92.92	93.79	66.38	242.81	240.38		
20050622	248.25	256.50	249.75	84.85	91.11	62.48	244.50	240.82		
20050623	246.00	251.00	246.75	73.94	83.90	58.07	246.33	241.23		
20050624	250.00	253.25	252.75	74.55	77.78	63.60	248.33	241.85		
20050627	235.00	247.25	241.50	64.55	71.01	50.22	248.64	241.83		
20050628	236.25	241.50	238.50	54.55	64.55	47.36	247.97	241.82		
20050629	235.75	241.50	237.00	35.45	51.52	45.95	247.03	241.71		
20050630	229.50	235.00	231.75	23.36	37.79	41.32	245.11	241.24		
20050701	233.00	236.50	235.75	19.79	26.20	45.80	242.89	241.27		
20050705	241.00	255.00	251.00	36.70	26.62	58.75	242.75	241.98		
20050706	249.50	254.00	251.00	60.24	38.91	58.75	242.89	242.57		
20050707	245.50	255.00	253.00	81.35	59.43	60.19	243.58	243.27		
20050708	243.00	250.00	246.25	75.54	72.38	53.39	242.86	243.82		
20050711	242.50	249.00	246.75	70.53	75.80	53.81	243.44	244.40		
20050712	242.00	248.00	247.00	63.39	69.82	54.03	244.39	245.20		
20050713	247.25	258.25	256.25	73.92	69.28	61.39	246.53	246.23		
20050714	258.00	265.00	261.75	82.90	73.40	64.99	249.86	247.32		
20050715	260.50	269.00	268.00	93.79	83.53	68.57	253.44	248.44		
20050718	263.00	273.00	270.00	93.81	90.16	69.64	255.56	249.61		
20050719	254.50	267.50	259.00	86.13	91.24	57.95	256.44	250.08		
20050720	247.50	255.00	252.25	71.07	83.67	52.17	256.36	249.92		
20050721	243.00	247.00	244.75	49.83	69.01	46.61	256.19	249.56		
20050722	243.00	248.00	244.75	31.13	50.68	46.61	255.97	249.32		
20050725	238.50	243.50	241.25	16.35	32.44	44.06	255.33	249.06		
20050726	243.50	249.25	245.25	13.08	20.19	47.58	254.11	248.70		
20050727	244.50	248.25	247.75	18.12	15.85	49.71	252.56	249.00		
20050728	250.25	252.75	252.50	28.99	20.06	53.57	250.83	249.67		
20050729	248.00	252.50	248.25	31.88	26.33	49.88	248.42	250.20		
20050801	243.25	251.00	244.25	28.50	29.79	46.63	246.78	250.80		
20050802	242.25	247.50	245.50	21.74	27.38	47.78	246.03	251.26		
20050803	237.25	246.25	240.00	14.88	21.71	43.36	245.50	250.74		
20050804	237.00	239.50	237.50	9.79	15.47	41.48	244.69	250.10		
20050805	232.75	236.25	234.50	4.71	9.79	39.28	243.94	249.21		
20050808	235.00	239.50	235.75	6.64	7.04	40.69	242.89	248.71		
20050809	230.50	234.50	232.75	9.54	6.96	38.39	241.22	248.05		
20050810	232.25	237.00	236.50	16.85	11.01	42.75	239.44	247.55		
20050811	236.00	238.75	238.25	23.97	16.79	44.72	238.33	246.69		
20050812	230.00	236.00	231.00	22.06	20.96	38.78	236.86	245.23		
20050815	223.00	227.25	223.25	13.36	19.80	33.63	234.39	243.10		
20050816	222.00	225.75	222.25	2.02	12.48	33.02	232.42	240.82		
20050817	221.25	226.75	226.50	6.15	7.17	38.15	231.19	239.27		
20050818	224.50	228.00	224.75	9.79	5.99	36.89	230.11	237.96		
20050819	222.00	226.00	223.50	12.38	9.44	35.99	228.75	236.95		
20050822	224.50	226.75	226.00	13.11	11.76	39.21	228.00	236.06		
20050823	223.50	228.50	224.00	14.21	13.23	37.58	226.61	235.24		
20050824	221.75	224.50	222.25	13.18	13.50	36.16	224.83	234.14		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20050825	218.75	223.50	219.75	8.46	11.95	34.18	223.58	232.81		
20050826	217.00	220.00	217.75	4.58	8.74	32.64	222.97	231.15		
20050829	219.25	222.00	219.50	6.59	6.54	35.38	222.67	229.79		
20050830	218.00	221.75	218.50	7.28	6.15	34.52	221.78	228.56		
20050831	215.00	220.50	216.50	8.51	7.46	32.79	220.86	227.18		
20050901	216.75	222.50	222.25	22.58	12.79	41.81	220.72	226.33		
20050902	216.75	220.50	217.25	25.84	18.98	37.14	219.75	225.37		
20050906	218.25	222.25	221.25	38.89	29.10	42.66	219.44	224.74		
20050907	216.50	220.00	217.50	27.16	30.63	39.19	218.92	223.87		
20050908	215.75	218.25	216.25	24.69	30.25	38.07	218.53	223.08		
20050909	215.75	216.75	216.00	11.73	21.19	37.84	218.33	222.11		
20050912	206.50	211.75	211.50	13.13	16.52	33.85	217.44	220.83		
20050913	208.50	210.50	210.00	16.53	13.80	32.62	216.50	219.83		
20050914	207.00	209.75	207.75	16.51	15.39	30.81	215.53	219.10		
20050915	205.75	208.00	206.50	10.42	14.49	29.81	213.78	218.35		206.50
20050916	205.50	208.00	206.25	5.41	10.78	29.61	212.56	217.38		206.25
20050919	205.75	207.50	206.25	4.43	6.76	29.61	210.89	216.50		206.25
20050920	205.75	207.50	206.75	5.39	5.08	30.72	209.69	215.70		
20050921	205.00	207.50	206.50	6.78	5.53	30.46	208.61	214.77		
20050922	206.50	210.00	208.25	11.59	7.92	34.60	207.75	214.02		
20050923	206.75	209.75	207.25	13.49	10.62	33.37	207.28	213.31		
20050926	204.25	206.75	204.50	11.16	12.08	30.21	206.67	212.58		
20050927	203.00	204.50	203.25	5.42	10.02	28.87	206.17	211.89		203.25
20050928	202.75	205.25	203.25	2.27	6.28	28.87	205.81	211.12		203.25
20050929	202.50	204.75	203.50	5.34	4.34	29.60	205.50	210.40		203.50
20050930	205.00	207.00	205.50	17.29	8.30	35.27	205.42	209.88		
20051003	205.00	209.50	208.75	43.88	22.17	43.27	205.64	209.24		
20051004	204.75	206.75	205.75	54.72	38.63	38.54	205.56	208.69		
20051005	204.50	206.25	204.75	52.22	50.28	37.08	205.17	207.90		
20051006	203.75	205.50	204.25	32.22	46.39	36.34	204.83	207.27		
20051007	202.25	204.25	202.50	18.85	34.43	33.80	204.61	206.62		
20051010	201.75	202.75	202.00	9.86	20.31	33.09	204.47	205.95		
20051011	202.25	204.25	202.50	5.12	11.28	34.57	204.39	205.52		
20051012	203.75	207.50	205.75	20.71	11.90	43.37	204.64	205.32		
20051013	202.75	205.25	203.50	27.22	17.68	39.42	204.42	205.12		
20051014	201.25	203.75	203.50	33.28	27.07	39.42	203.83	204.98		
20051017	201.25	204.50	203.75	26.72	29.08	40.12	203.61	204.86		
20051018	201.75	204.00	202.00	22.22	27.41	36.89	203.31	204.65		
20051019	201.25	202.25	201.75	15.15	21.36	36.44	203.03	204.42		
20051020	201.25	203.00	202.75	11.11	16.16	39.62	203.06	204.24		
20051021	201.00	201.75	201.50	10.64	12.30	37.12	203.00	203.92		
20051024	199.25	201.50	199.50	9.63	10.46	33.48	202.67	203.55		
20051025	198.75	200.50	199.50	6.43	8.90	33.48	201.97	203.31		
20051026	198.00	199.25	198.25	4.74	6.94	31.26	201.39	203.07		
20051027	197.50	198.25	197.75	4.57	5.25	30.39	200.75	202.81		
20051028	196.75	198.25	197.00	2.49	3.93	29.09	200.00	202.50		197.00
20051031	196.00	197.00	196.25	2.33	3.13	27.80	199.36	202.06		196.25
20051101	196.25	198.50	196.75	4.20	3.01	30.02	198.81	201.49		
20051102	195.75	196.75	196.00	4.38	3.64	28.60	198.06	201.02		196.00
20051103	196.25	197.50	196.25	5.56	4.71	29.79	197.47	200.62		196.25
20051104	195.25	196.75	195.50	3.81	4.58	28.27	197.03	200.20		195.50
20051107	194.25	195.25	194.75	4.76	4.71	26.79	196.50	199.83		194.75
20051108	194.50	195.75	195.25	6.67	5.08	29.44	196.17	199.51		195.25
20051109	194.50	196.25	195.25	10.16	7.20	29.44	195.89	199.17		195.25
20051110	193.50	194.75	193.75	9.30	8.71	26.15	195.53	198.60		193.75
20051111	193.25	196.00	195.50	15.83	11.76	35.24	195.44	198.21		
20051114	196.00	199.50	196.75	30.05	18.39	40.85	195.44	197.89		
20051115	195.50	198.50	195.75	42.34	29.41	38.01	195.42	197.51		
20051116	192.25	196.00	192.75	34.30	35.57	31.05	195.03	197.07		
20051117	191.75	192.75	192.25	17.78	31.48	30.06	194.67	196.62		
20051118	190.75	192.25	191.25	6.35	19.48	28.14	194.28	196.07		191.25

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20051121	191.25	192.25	191.50	6.91	10.35	29.36	193.86	195.60		191.50
20051122	191.25	192.50	191.50	7.62	6.96	29.36	193.44	195.21		191.50
20051123	190.50	191.75	190.75	6.64	7.06	27.72	193.11	194.80		190.75
20051125	189.25	190.75	189.75	5.41	6.56	25.66	192.47	194.39		189.75
20051128	187.25	189.25	187.75	3.91	5.32	22.13	191.47	193.92		187.75
20051129	186.00	187.50	186.25	3.60	4.31	19.91	190.42	193.40		186.25
20051130	186.50	187.75	187.50	5.68	4.40	26.52	189.83	192.99		187.50
20051201	186.50	189.50	189.25	12.35	7.21	34.64	189.50	192.63		
20051202	189.25	191.25	189.75	20.99	13.00	36.79	189.33	192.33		
20051205	189.50	194.75	193.50	37.28	23.54	50.06	189.56	192.20		
20051206	190.00	193.50	190.75	45.09	34.45	42.94	189.47	191.98		
20051207	186.75	190.50	187.00	39.64	40.67	35.52	189.06	191.61		
20051208	186.75	188.75	188.25	28.21	37.65	39.29	188.89	191.27		
20051209	186.00	190.00	189.75	26.67	31.51	43.55	189.11	191.01		
20051212	192.75	195.00	194.25	53.41	36.10	53.98	190.00	191.04		
20051213	191.00	195.50	195.50	78.17	52.75	56.39	190.89	191.04		
20051214	193.50	197.50	194.25	87.8	73.13	53.38	191.44	190.92		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2006

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20051202	238.75	240.25	239.00							
20051205	239.00	245.00	242.75							
20051206	240.00	242.50	240.50							
20051207	237.75	240.00	238.25							
20051208	237.75	239.75	239.00							
20051209	237.75	241.50	241.25							
20051212	243.00	245.50	244.25							
20051213	241.75	245.50	245.25							
20051214	243.75	245.75	244.00				241.58			
20051215	242.50	243.75	242.75				242.00			
20051216	244.00	246.00	244.75				242.22			
20051219	244.25	246.25	245.50				242.78			
20051220	245.25	248.00	246.25				243.67			
20051221	244.75	246.25	246.00				244.44			
20051222	246.75	248.00	247.75				245.17			
20051223	247.25	249.00	248.50	91.20		64.20	245.64			
20051227	247.25	249.25	249.00	96.98		65.12	246.06			
20051228	248.50	250.00	249.00	95.07	94.42	65.12	246.61			
20051229	245.25	248.50	246.25	86.35	92.80	55.89	247.00			
20051230	244.25	249.50	248.25	80.00	87.14	60.30	247.39			
20060103	249.25	252.00	251.50	81.10	82.48	66.21	248.06	244.75		
20060104	249.25	251.25	251.00	87.79	82.97	64.62	248.58	245.32		
20060105	246.75	249.75	249.00	84.34	84.41	58.55	248.92	245.62		
20060106	247.75	250.00	248.25	70.34	80.82	56.41	248.97	245.99		
20060109	244.50	246.00	245.75	46.97	67.22	49.86	248.67	246.35		
20060110	245.00	248.00	247.75	39.21	52.17	54.42	248.53	246.76		
20060111	247.25	249.25	249.00	41.94	42.71	57.04	248.53	247.13		
20060112	245.00	248.50	248.00	51.61	44.25	54.35	248.72	247.31		
20060113	247.50	249.00	248.75	55.91	49.82	56.03	248.78	247.48		
20060117	244.50	248.00	245.25	39.78	49.10	47.28	248.08	247.54		
20060118	242.00	243.50	243.25	27.82	41.17	43.14	247.22	247.56		
20060119	242.00	244.00	242.25	9.30	25.64	41.19	246.47	247.44		
20060120	241.25	243.00	242.50	8.88	15.33	41.90	245.83	247.30		
20060123	243.50	246.25	246.00	19.44	12.54	50.79	245.86	247.29		
20060124	245.75	250.25	249.50	46.10	24.81	57.76	246.06	247.45		
20060125	250.50	253.25	252.25	72.78	46.11	62.27	246.42	247.67		
20060126	250.00	253.00	252.75	90.00	69.63	63.05	246.94	247.87		
20060127	252.25	255.00	254.25	94.02	85.60	65.34	247.56	248.12		
20060130	252.25	256.00	253.75	91.71	91.91	63.92	248.50	248.35		
20060131	253.00	256.00	255.75	92.53	92.75	67.02	249.89	248.80		
20060201	252.50	254.75	254.00	89.83	91.36	62.00	251.19	249.07		
20060202	253.00	257.00	256.75	94.39	92.25	66.27	252.78	249.32		
20060203	257.25	260.50	260.00	94.09	92.77	70.50	254.33	249.75	260.00	
20060206	257.00	260.75	258.50	94.76	94.41	66.37	255.33	250.20		
20060207	254.00	258.75	254.50	84.60	91.15	56.81	255.58	250.50		
20060208	253.25	259.50	256.50	78.21	85.86	59.91	256.00	251.01		
20060209	257.25	261.25	260.75	81.11	81.31	65.58	256.72	251.63		
20060210	255.50	259.25	257.25	83.19	80.84	58.27	257.11	252.02		
20060213	255.00	257.25	257.00	77.87	80.72	57.78	257.25	252.45		
20060214	254.00	256.50	256.25	63.99	75.02	56.23	257.50	252.81		
20060215	254.25	259.00	258.50	62.41	68.09	59.71	257.69	253.44		
20060216	257.75	260.25	259.75	69.44	65.28	61.54	257.67	254.23		
20060217	259.50	262.00	261.75	83.38	71.74	64.33	258.03	255.15		
20060221	260.00	262.00	261.75	92.69	81.84	64.33	258.83	256.07		
20060222	258.25	261.50	259.25	88.06	88.04	58.21	259.14	256.70		
20060223	256.75	260.75	259.75	80.37	87.04	59.05	259.03	257.19		
20060224	261.00	264.50	264.25	80.50	82.98	65.72	259.81	257.76		
20060227	262.50	264.75	264.50	89.96	83.61	66.05	260.64	258.32		
20060228	263.25	264.75	264.25	97.09	89.18	65.37	261.53	258.80		
20060301	260.75	262.50	261.50	87.75	91.60	58.27	261.86	259.17		
20060302	260.00	265.50	265.00	87.02	90.62	63.68	262.44	259.61		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20060303	264.00	266.00	265.50	87.08	87.29	64.39	262.86	260.15		
20060306	258.25	262.00	259.50	79.11	84.40	51.40	262.61	260.29		
20060307	257.25	260.75	257.75	57.15	74.45	48.34	262.44	260.18		
20060308	256.25	257.75	256.75	26.92	54.39	46.63	262.11	260.10		
20060309	257.50	261.50	260.75	27.02	37.03	53.69	261.72	260.39		
20060310	258.50	263.75	263.00	40.17	31.37	57.12	261.56	260.70		
20060313	257.00	260.00	258.00	44.44	37.21	48.51	260.86	260.57		
20060314	255.50	261.25	261.00	46.52	43.71	53.08	260.81	260.75		
20060315	257.00	261.75	259.25	35.35	42.10	50.28	260.17	260.86		
20060316	255.50	259.00	255.75	30.16	37.34	45.14	259.08	260.83		
20060317	252.50	256.00	253.25	14.55	26.69	41.86	258.39	260.58		
20060320	249.25	253.25	250.50	5.13	16.61	38.53	257.58	260.14		
20060321	249.75	254.50	253.75	13.29	10.99	44.17	257.25	259.76		
20060322	252.75	255.50	253.75	20.40	12.94	44.17	256.47	259.38		
20060323	250.50	253.00	251.25	22.51	18.73	40.83	255.17	259.00		
20060324	250.75	253.50	251.50	18.73	20.54	41.31	254.44	258.61		
20060327	252.75	255.00	254.50	21.84	21.02	46.86	253.72	258.14		
20060328	253.00	255.25	254.50	29.31	23.29	46.86	253.19	257.67		
20060329	255.25	257.25	256.75	41.38	30.84	50.90	253.31	257.31		
20060330	257.50	260.25	260.00	57.98	42.89	56.10	254.06	257.24		
20060331	267.00	270.00	268.00	76.03	58.46	65.71	256.00	257.38		
20060403	267.50	270.00	268.25	89.31	74.44	65.96	257.61	257.51		
20060404	265.50	267.25	266.50	88.35	84.56	62.51	259.03	257.85		
20060405	265.50	268.50	268.00	88.35	88.67	64.24	260.89	258.33		
20060406	269.00	273.25	272.75	90.47	89.06	69.09	263.25	259.10		
20060407	269.75	275.00	274.50	95.43	91.42	70.67	265.47	259.75	274.50	
20060410	270.75	274.25	272.75	95.58	93.83	66.98	267.50	260.21		
20060411	270.00	274.25	273.75	94.58	95.20	68.01	269.39	260.96		
20060412	268.75	273.25	269.25	87.33	92.50	59.11	270.42	261.36		
20060413	267.00	269.75	268.50	80.66	87.52	57.75	270.47	261.80		
20060417	269.00	273.25	269.25	73.65	80.55	58.77	270.58	262.44		
20060418	270.00	273.50	272.25	76.91	77.07	62.65	271.22	263.35		
20060419	271.50	274.25	272.00	80.93	77.16	62.13	271.67	264.37		
20060420	267.25	272.00	269.50	70.35	76.06	56.98	271.31	265.12		
20060421	267.25	272.00	270.75	60.08	70.45	58.82	270.89	265.93		
20060424	266.50	272.50	267.00	37.72	56.05	51.69	270.25	266.68		
20060425	264.50	268.00	265.75	27.65	41.82	49.54	269.36	267.36		
20060426	265.00	268.00	266.25	14.79	26.72	50.43	269.03	267.92		
20060427	262.75	266.25	266.00	18.37	20.27	49.95	268.75	268.46		
20060428	267.75	273.25	271.75	40.49	24.55	59.41	269.03	269.18		
20060501	270.75	274.75	271.50	59.24	39.36	58.89	268.94	269.73		
20060502	266.75	270.75	267.00	62.20	53.97	50.33	268.39	269.68		
20060503	263.75	268.50	266.00	45.14	55.52	48.64	268.00	269.57		
20060504	262.25	266.75	262.50	21.50	42.95	43.17	267.08	269.38		
20060505	263.75	267.50	264.00	14.36	27.00	45.98	266.75	269.19		
20060508	259.50	262.50	261.25	9.16	15.01	41.90	266.25	268.64		
20060509	262.50	265.00	263.00	16.14	13.22	45.23	265.89	268.10		
20060510	264.00	267.25	265.25	24.04	16.45	49.26	265.81	267.74		
20060511	267.25	271.75	271.25	45.90	28.70	58.10	265.75	267.62		
20060512	278.00	286.00	281.75	66.24	45.39	68.47	266.89	268.21		
20060515	279.25	284.00	283.75	84.17	65.44	69.99	268.75	268.94		
20060516	281.00	284.25	283.00	88.05	79.49	68.65	270.64	269.60		
20060517	281.50	287.00	286.75	93.09	88.44	71.58	273.33	270.29	286.75	
20060518	283.75	287.25	285.25	93.52	91.55	68.81	275.69	270.92		
20060519	277.00	281.00	277.25	85.28	90.63	56.31	277.47	271.29		
20060522	272.25	279.25	278.75	75.38	84.73	57.85	279.22	271.67		
20060523	274.50	280.75	277.50	66.07	75.57	56.07	280.58	272.17		
20060524	272.25	275.25	274.25	62.46	67.97	51.62	280.92	272.57		
20060525	273.50	278.25	278.00	61.56	63.36	55.96	280.50	273.13		
20060526	278.75	282.50	279.00	62.16	62.06	57.07	279.97	273.75		
20060530	278.50	282.75	279.75	67.03	63.58	57.92	279.61	274.13		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20060531	275.50	279.00	277.00	61.05	63.41	53.71	278.53	274.39		
20060601	273.50	281.75	280.75	57.72	61.93	58.18	278.03	275.05		
20060602	280.75	285.75	285.00	63.47	60.75	62.59	278.89	275.95		
20060605	278.00	283.50	278.75	61.67	60.95	53.63	278.89	276.73		
20060606	273.00	277.25	273.50	45.56	56.90	47.48	278.44	277.18		
20060607	270.00	277.25	276.75	30.27	45.83	51.21	278.72	277.92		
20060608	270.25	274.50	271.00	17.94	31.25	45.11	277.94	278.30		
20060609	266.25	273.50	267.75	17.72	21.98	42.06	276.69	278.42		
20060612	273.00	277.00	273.50	17.07	17.58	48.67	276.00	278.52		
20060613	268.00	272.25	268.75	19.23	18.01	44.18	275.08	277.90		
20060614	261.75	270.00	262.25	17.36	17.89	38.90	273.03	276.88		
20060615	257.50	264.00	258.50	6.15	14.25	36.21	270.08	275.71		
20060616	259.25	262.50	261.25	6.30	9.94	39.51	268.14	274.50		
20060619	255.00	258.25	255.75	6.42	6.29	35.55	266.17	273.10		
20060620	253.50	256.50	256.00	7.82	6.85	35.86	263.86	272.08		
20060621	255.75	259.50	259.00	9.08	7.77	39.67	262.53	271.14		
20060622	256.00	260.00	257.00	12.16	9.69	38.05	261.33	270.17		
20060623	254.75	257.25	255.25	12.03	11.09	36.64	259.31	269.26		
20060626	247.75	252.00	249.00	7.76	10.65	32.06	257.11	267.88		
20060627	248.00	251.75	251.25	7.86	9.21	35.20	255.89	266.56		
20060628	251.75	255.00	252.00	10.24	8.62	36.26	255.17	265.24		
20060629	252.50	256.25	254.50	16.52	11.54	39.78	254.42	264.17		
20060630	257.50	261.75	260.25	29.54	18.77	47.04	254.92	263.19		
20060703	262.00	270.00	268.50	55.79	33.95	55.36	256.31	262.40		
20060705	263.00	268.25	264.50	73.19	52.84	51.16	256.92	261.73		
20060706	267.00	272.00	270.25	87.11	72.03	56.29	258.39	261.57		
20060707	263.00	267.25	265.75	80.76	80.35	51.71	259.56	261.05		
20060710	270.00	277.00	272.50	83.88	83.92	57.32	262.17	261.12		
20060711	275.50	280.00	279.25	85.51	83.38	62.06	265.28	261.67		
20060712	274.50	284.50	284.00	93.64	87.67	65.01	268.83	262.17		
20060713	275.75	281.00	276.00	91.06	90.07	56.98	271.22	262.51		
20060714	274.25	279.25	276.75	84.81	89.84	57.51	273.06	263.20		
20060717	267.50	275.50	268.00	70.19	82.02	49.81	273.00	263.65		
20060718	260.00	268.50	262.50	55.51	70.17	45.66	272.78	263.71		
20060719	254.75	263.25	261.75	38.84	54.85	45.11	271.83	264.00		
20060720	257.25	264.50	259.25	25.62	39.99	43.24	271.11	264.15		
20060721	251.00	255.00	253.50	17.16	27.21	39.21	269.00	263.89		
20060724	253.75	256.75	255.25	11.76	18.18	41.01	266.33	263.81		
20060725	255.75	260.75	256.00	11.69	13.54	41.81	263.22	263.85		
20060726	252.50	256.00	252.75	10.95	11.47	39.33	260.64	264.02		
20060727	252.00	255.25	254.25	9.95	10.86	41.07	258.14	264.17		
20060728	253.00	256.00	253.50	7.46	9.45	40.44	256.53	264.24		
20060731	253.75	257.00	256.00	10.70	9.37	43.52	255.81	264.31		
20060801	254.00	259.00	257.75	14.96	11.04	45.64	255.36	264.19		
20060802	258.50	265.50	264.25	28.11	17.92	52.72	255.92	263.99		
20060803	261.00	264.25	262.00	38.10	27.06	50.28	256.86	263.87		
20060804	260.50	265.75	262.25	52.03	39.41	50.56	257.64	263.49		
20060807	256.00	259.25	257.00	49.95	46.69	44.95	257.75	263.07		
20060808	252.00	255.50	253.00	39.51	47.16	41.20	257.78	262.14		
20060809	253.50	257.00	256.75	31.07	40.18	45.77	258.06	261.07		
20060810	255.50	257.50	255.75	26.61	32.40	44.77	258.31	259.73		
20060811	241.25	249.50	241.75	22.77	26.81	33.69	256.72	258.10		
20060814	234.25	239.25	238.25	14.00	21.12	31.58	254.56	256.26		
20060815	235.50	239.25	238.50	9.41	15.39	31.91	251.69	254.86		
20060816	237.75	242.00	238.00	12.70	12.04	31.58	249.03	253.69		
20060817	234.00	239.25	235.50	10.04	10.72	29.94	246.06	252.44		235.50
20060818	233.50	236.00	235.75	7.87	10.20	30.33	243.69	251.32		
20060821	235.50	237.75	237.50	8.03	8.65	33.14	241.97	250.56		
20060822	234.75	237.50	236.00	9.04	8.32	31.95	239.67	249.64		
20060823	235.75	241.75	240.00	13.44	10.17	38.31	237.92	248.88		
20060824	240.50	244.75	244.25	23.22	15.23	44.27	238.19	248.48		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20060825	240.00	244.75	241.75	32.09	22.92	41.71	238.58	247.88		
20060828	240.50	243.75	241.00	35.79	30.37	40.95	238.86	247.29		
20060829	238.50	241.75	238.75	29.17	32.35	38.67	238.94	246.46		
20060830	238.25	245.25	244.75	41.15	35.37	47.14	239.97	245.85		
20060831	243.00	248.25	248.00	63.50	44.60	51.08	241.33	245.07		
20060901	245.25	247.75	245.75	83.89	62.84	48.39	242.25	244.30		
20060905	243.50	249.75	244.25	82.50	76.63	46.63	243.17	243.44		
20060906	240.50	244.00	240.75	64.61	77.00	42.72	243.25	242.67		
20060907	238.25	246.25	245.75	62.05	69.72	49.26	243.42	242.32		
20060908	244.50	248.25	246.00	65.00	63.89	49.57	243.89	241.81		
20060911	239.75	244.50	243.50	69.57	65.54	46.51	244.17	241.23		
20060912	237.25	241.00	237.75	49.21	61.26	40.34	244.06	241.04		
20060913	237.00	240.50	237.75	26.17	48.32	40.34	243.28	241.01		
20060914	236.75	240.25	237.25	8.00	27.79	39.80	242.08	240.95		
20060915	236.00	242.50	241.75	17.18	17.12	46.63	241.64	241.13		
20060918	244.00	248.75	247.75	43.71	22.96	54.11	242.03	241.71		
20060919	244.75	249.50	246.50	67.88	42.92	52.46	242.67	242.23		
20060920	246.50	249.50	249.00	85.45	65.68	55.39	243.03	242.77		
20060921	250.75	257.75	257.25	89.54	80.96	63.40	244.28	243.79		
20060922	254.75	257.75	255.25	93.58	89.53	60.56	245.58	244.51		
20060925	252.50	255.75	254.75	90.80	91.31	59.84	247.47	245.01		
20060926	256.00	260.00	259.00	90.18	91.52	63.79	249.83	245.83		
20060927	253.50	260.25	253.75	85.08	88.69	56.41	251.67	246.44		
20060928	254.00	264.75	264.25	89.10	88.12	65.11	254.17	247.65		
20060929	261.50	267.75	262.50	84.97	86.38	62.86	255.81	248.50		
20061002	265.25	269.50	267.75	92.17	88.75	66.59	258.17	249.44		
20061003	261.75	265.00	264.00	87.27	88.14	61.81	259.83	250.31		
20061004	261.75	276.00	274.25	91.33	90.26	68.47	261.72	251.74		
20061005	269.50	276.25	271.75	88.42	89.01	65.47	263.56	253.21		
20061006	270.25	275.75	271.00	88.33	89.36	64.56	265.36	254.42		
20061009	276.00	291.00	289.50	88.67	88.47	74.14	268.75	256.49	289.50	
20061010	275.00	288.50	275.50	80.48	85.83	60.75	271.17	258.01		
20061011	277.00	289.50	284.00	79.98	83.04	64.90	273.36	260.21		
20061012	297.50	304.00	298.25	77.38	79.28	70.52	277.33	263.10	298.25	
20061013	301.00	317.00	314.50	88.91	82.09	75.36	282.53	266.77	314.50	
20061016	309.50	317.75	316.75	94.45	86.91	75.95	288.39	270.35	316.75	
20061017	316.50	324.50	321.00	96.51	93.29	77.07	293.58	273.83	321.00	
20061018	313.50	318.50	315.50	93.06	94.68	72.39	298.44	277.12	315.50	
20061019	314.25	321.50	316.00	89.07	92.88	72.55	303.44	280.31	316.00	
20061020	311.50	317.50	312.75	84.48	88.87	69.67	306.03	282.95		
20061023	307.25	320.25	318.25	85.92	86.49	71.72	310.78	285.95	318.25	
20061024	316.25	326.75	324.25	88.98	86.46	73.79	315.25	289.26	324.25	
20061025	325.00	333.75	327.00	91.68	88.86	74.71	318.44	292.50	327.00	
20061026	321.75	328.50	327.00	91.17	90.61	74.71	319.83	295.99	327.00	
20061027	327.50	334.00	332.50	91.78	91.54	76.61	321.58	299.24	332.50	
20061030	327.25	332.50	329.50	92.69	91.88	73.37	322.53	302.43	329.50	
20061031	320.00	326.75	320.75	84.42	89.63	64.78	323.11	304.95		
20061101	320.75	334.00	333.50	84.76	87.29	70.25	325.06	308.26	333.50	
20061102	343.50	353.50	344.75	81.09	83.42	74.07	328.61	311.62	344.75	
20061103	340.50	348.00	342.25	85.08	83.64	71.86	331.28	314.98	342.25	
20061106	339.25	345.50	343.50	78.38	81.52	72.31	333.42	318.43	343.50	
20061107	341.25	352.50	351.00	82.88	82.11	74.88	336.08	321.36	351.00	
20061108	355.75	367.00	357.75	85.83	82.36	76.95	339.50	325.27	357.75	
20061109	349.50	360.00	350.00	83.55	84.09	69.83	341.44	328.42		
20061110	342.25	348.50	343.25	69.76	79.71	64.25	342.97	330.56		
20061113	341.50	349.75	342.50	57.54	70.28	63.64	345.39	331.89		
20061114	341.50	361.50	357.75	60.46	62.59	69.88	348.08	333.85		
20061115	355.50	365.75	358.25	69.86	62.62	70.07	349.58	335.62		
20061116	350.00	365.00	351.50	76.24	68.85	64.42	350.61	337.33		
20061117	346.00	356.00	355.25	74.47	73.52	66.06	351.92	339.20		
20061120	358.00	372.00	360.00	72.87	74.53	68.06	352.92	341.45		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20061121	357.50	362.00	361.25	72.92	73.42	68.59	353.31	343.50		
20061122	357.50	365.50	362.75	71.84	72.54	69.24	354.72	345.33		
20061124	362.00	370.00	369.25	76.84	73.87	71.96	357.61	347.35	369.25	
20061127	366.50	374.75	371.50	84.55	77.75	72.86	360.83	349.46	371.50	
20061128	364.50	369.50	368.75	87.95	83.12	69.92	362.06	351.19		
20061129	361.50	371.00	370.25	86.24	86.25	70.62	363.39	353.13	370.25	
20061130	365.50	378.00	377.00	88.56	87.58	73.58	366.22	355.81	377.00	
20061201	371.50	376.00	374.00	90.92	88.57	70.19	368.31	357.74	374.00	
20061204	359.50	369.50	362.75	81.51	87.00	59.18	368.61	358.60		
20061205	358.75	367.00	366.25	70.18	80.87	61.22	369.17	359.74		
20061206	351.75	362.50	353.00	47.79	66.49	50.86	368.08	360.19		
20061207	351.75	359.50	358.50	41.41	53.13	54.32	366.89	360.55		
20061208	353.50	360.00	354.25	23.49	37.56	51.32	364.97	360.38		
20061211	349.50	359.25	355.50	23.21	29.37	52.15	363.50	360.64		
20061212	356.50	361.50	359.00	21.30	22.67	54.51	362.25	361.39		
20061213	351.00	356.50	354.50	23.98	22.83	51.03	359.75	361.96		
20061214	353.50	359.50	358.75	27.78	24.35	54.02	358.06	362.01		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2007

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20061201	357.50	362.25	360.25							
20061204	351.00	355.25	354.75							
20061205	349.50	358.00	357.50							
20061206	348.50	352.50	349.25							
20061207	347.50	355.00	354.00							
20061208	350.00	355.00	350.25							
20061211	346.00	354.75	351.25							
20061212	352.00	355.50	354.75							
20061213	350.00	354.25	350.50				353.61			
20061214	349.00	360.00	358.25				353.39			
20061215	355.50	361.50	361.00				354.08			
20061218	356.50	362.00	361.75				354.56			
20061219	361.00	366.00	365.50				356.36			
20061220	362.50	367.00	365.00				357.58			
20061221	366.00	368.75	368.00				359.56			
20061222	368.00	371.50	371.00	95.07		66.33	361.75			
20061226	370.50	374.00	371.50	95.27		66.69	363.61			
20061227	369.50	371.50	371.25	93.10	94.48	66.31	365.92			
20061228	371.75	375.00	373.75	92.31	93.56	68.27	367.64			
20061229	372.50	375.00	374.75	95.00	93.47	69.04	369.17			
20070103	361.00	370.00	362.00	81.61	89.64	51.70	369.19	361.25		
20070104	357.00	366.00	359.00	62.53	79.71	48.60	368.47	361.19		
20070105	358.75	365.50	365.25	50.32	64.82	54.69	368.50	361.69		
20070108	359.50	365.25	364.75	49.47	54.11	54.14	368.14	362.04		
20070109	357.50	362.50	358.00	39.35	46.38	47.21	366.69	362.45		
20070110	354.50	362.50	360.00	27.46	38.76	49.28	365.42	362.74		
20070111	365.00	375.00	374.50	44.17	36.99	61.17	365.78	363.89		
20070112	388.00	394.50	394.50	74.80	48.81	71.20	368.08	365.95		
20070116	387.00	403.00	387.75	88.71	69.22	65.09	369.53	367.52		
20070117	388.00	400.00	389.00	79.90	81.13	65.68	372.53	369.36		
20070118	388.25	396.50	391.50	71.99	80.20	66.88	376.14	370.94		
20070119	388.00	395.00	390.75	74.05	75.32	66.13	378.97	372.36		
20070122	388.00	397.25	396.50	79.21	75.09	68.99	382.50	374.01		
20070123	399.00	403.00	402.75	86.94	80.07	71.78	387.47	375.79	402.75	
20070124	395.50	399.00	397.75	91.75	85.97	66.62	391.67	377.35		
20070125	394.00	401.50	399.25	93.64	90.78	67.38	394.42	378.83		
20070126	395.75	399.75	398.50	90.72	92.04	66.56	394.86	380.14		
20070129	391.50	396.50	394.50	88.49	90.95	62.24	395.61	381.24		
20070130	391.75	399.00	397.75	87.46	88.89	64.27	396.58	382.50		
20070131	394.00	399.75	394.75	83.31	86.42	61.01	396.94	383.50		
20070201	391.75	398.50	392.50	67.28	79.35	58.61	397.14	384.35		
20070202	390.50	398.00	397.25	58.91	69.83	62.01	397.22	386.02		
20070205	393.50	398.50	395.00	48.37	58.19	59.52	396.36	387.74		
20070206	390.50	398.25	391.50	44.69	50.65	55.76	395.67	388.99		
20070207	388.50	394.00	391.00	30.00	41.02	55.23	394.75	390.24		
20070208	390.50	397.00	396.50	33.33	36.01	59.80	394.53	392.07		
20070209	394.00	401.75	399.25	50.27	37.87	61.90	395.06	393.94		
20070212	397.75	400.00	398.50	68.76	50.79	60.97	395.14	395.08		
20070213	399.00	403.50	403.00	82.09	67.04	64.44	396.06	395.49		
20070214	398.25	405.00	401.25	83.14	78.00	62.12	397.03	396.13		
20070215	402.25	406.00	404.50	88.46	84.56	64.66	397.83	396.87		
20070216	403.25	414.00	413.25	88.59	86.73	70.41	399.86	397.90	413.25	
20070220	411.00	414.00	413.25	95.18	90.74	70.41	402.28	398.98	413.25	
20070221	411.00	425.00	423.00	96.21	93.33	75.54	405.83	400.24	423.00	
20070222	422.00	429.50	427.75	95.77	95.72	77.59	409.31	401.43	427.75	
20070223	419.50	425.75	420.75	89.64	93.87	68.51	411.69	402.52		
20070226	417.50	426.75	418.00	82.11	89.17	65.28	413.86	403.42		
20070227	402.00	414.50	409.50	67.28	79.68	56.42	414.58	403.94		
20070228	409.50	420.50	420.00	66.27	71.89	63.08	416.67	405.15		
20070301	403.50	414.50	413.25	60.36	64.64	57.04	417.64	405.89		
20070302	405.75	414.00	406.75	52.74	59.79	51.89	416.92	406.46		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20070305	399.00	410.00	408.75	38.72	50.61	53.29	416.42	407.24		
20070306	406.00	411.50	406.50	29.45	40.30	51.48	414.58	407.68		
20070307	404.50	412.50	409.25	31.20	33.12	53.56	412.53	408.36		
20070308	410.00	415.50	410.75	32.84	31.16	54.70	411.42	409.27		
20070309	406.50	412.75	407.75	33.61	32.55	51.95	410.28	410.07		
20070312	400.00	408.50	402.75	26.50	30.98	47.66	409.53	410.37		
20070313	395.25	404.50	400.75	19.01	26.37	46.02	407.39	410.44		
20070314	393.00	402.00	401.75	18.09	21.20	47.00	406.11	410.60		
20070315	397.00	404.50	397.50	18.44	18.52	43.39	405.08	410.33		
20070316	392.50	408.00	403.00	25.59	20.71	48.86	404.44	410.42		
20070319	400.00	406.50	406.00	33.02	25.68	51.61	404.39	410.49		
20070320	403.50	409.75	409.25	52.85	37.15	54.47	404.39	410.30		
20070321	407.25	411.50	409.50	64.98	50.28	54.69	404.25	410.12		
20070322	407.00	410.75	409.50	73.55	63.79	54.69	404.44	409.48		
20070323	409.00	414.00	409.75	74.28	70.94	54.94	405.22	408.62		
20070326	395.00	407.00	401.25	62.32	70.05	45.58	405.28	407.69		
20070327	398.50	403.00	401.50	50.72	62.44	45.87	405.25	406.90		
20070328	397.00	405.00	400.75	38.52	50.52	45.09	405.61	406.49		
20070329	396.00	404.50	403.50	42.89	44.04	48.55	405.67	405.70		
20070330	383.50	383.50	383.50	29.84	37.08	32.50	403.17	404.29		
20070402	363.50	370.50	369.50	21.01	31.25	26.01	398.75	402.51		
20070403	365.00	374.00	367.50	6.60	19.15	25.24	394.08	400.55		367.50
20070404	373.50	382.75	380.50	17.82	15.15	38.14	390.86	399.31		
20070405	380.75	387.50	386.75	29.21	17.88	43.21	388.31	398.24		
20070409	384.50	401.00	386.50	41.75	29.59	43.06	386.67	397.08		
20070410	381.50	400.00	394.50	50.99	40.65	49.22	385.89	396.45		
20070411	386.50	395.25	387.75	51.65	48.13	44.81	384.44	395.74		
20070412	378.25	389.00	387.25	52.15	51.60	44.49	382.64	395.10		
20070413	390.00	397.00	395.00	55.82	53.21	50.37	383.92	394.77		
20070416	386.75	394.75	390.25	61.30	56.42	47.08	386.22	394.43		
20070417	378.50	394.50	379.50	58.48	58.53	40.62	387.56	393.31		
20070418	377.00	384.00	381.50	48.97	56.25	42.21	387.67	392.14		
20070419	371.00	382.25	380.00	42.15	49.87	41.31	386.92	390.75		
20070420	372.50	376.75	374.75	39.30	43.47	38.26	385.61	389.10		
20070423	364.50	370.00	368.50	28.32	36.59	34.95	382.72	387.14		
20070424	369.50	374.50	372.50	20.96	29.53	38.61	381.03	385.37		
20070425	377.00	392.25	379.50	24.66	24.65	44.50	380.17	384.33		
20070426	369.00	386.00	374.00	29.68	25.10	41.16	377.83	383.02		
20070427	365.50	370.50	367.50	25.19	26.51	37.57	375.31	381.44		
20070430	358.00	367.00	364.50	17.05	23.97	36.01	373.64	379.58		
20070501	366.00	379.00	378.50	25.89	22.71	47.06	373.31	379.35		
20070502	376.00	384.00	380.25	42.09	28.35	48.26	373.33	379.86		
20070503	386.00	393.00	387.25	63.07	43.69	52.87	374.72	380.80		
20070504	385.50	391.50	390.50	75.23	60.13	54.89	377.17	381.27		
20070507	381.50	393.00	383.25	80.26	72.85	49.78	378.36	381.11		
20070508	365.00	371.00	366.50	61.82	72.44	40.43	376.92	380.15		
20070509	363.00	368.50	366.00	39.76	60.61	40.19	376.03	378.80		
20070510	356.00	366.50	356.50	16.16	39.25	35.79	374.81	377.31		
20070511	363.00	375.00	374.50	24.74	26.89	47.51	375.92	376.70		
20070514	370.75	379.00	371.00	30.63	23.84	45.76	375.08	375.56		
20070515	363.00	381.50	378.50	50.45	35.27	50.01	374.89	375.00		
20070516	374.25	382.50	377.50	53.15	44.74	49.45	373.81	374.90		
20070517	370.00	377.00	370.50	52.70	52.10	45.63	371.58	374.38		
20070518	366.00	373.50	366.50	41.89	49.25	43.55	369.72	373.74		
20070521	370.50	381.50	380.25	44.37	46.32	51.68	371.25	374.00		
20070522	367.75	378.50	369.25	43.24	43.17	45.98	371.61	374.04		
20070523	369.25	375.50	370.50	46.85	44.82	46.70	373.17	373.94		
20070524	370.00	376.00	372.75	40.09	43.39	48.04	372.97	373.62		
20070525	369.75	375.75	375.00	52.05	46.33	49.41	373.42	373.67		
20070529	365.50	370.75	367.50	53.45	48.53	45.13	372.19	373.67		
20070530	369.00	382.50	381.25	70.13	58.54	53.14	372.61	374.46		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20070531	380.25	389.50	384.75	73.58	65.72	54.94	374.19	374.76		
20070601	379.50	386.50	383.00	84.28	76.00	53.83	376.03	374.89		
20070604	382.00	387.25	383.00	77.67	78.51	53.83	376.33	374.69		
20070605	380.00	392.00	382.75	72.01	77.99	53.65	377.83	374.32		
20070606	377.50	384.75	381.25	66.67	72.12	52.51	379.03	374.23		
20070607	379.75	394.00	393.50	74.26	70.98	59.97	381.33	375.51		
20070608	386.00	395.75	392.25	82.04	74.32	58.95	383.25	376.76		
20070611	400.00	408.25	406.00	93.80	83.37	65.83	387.53	379.12		
20070612	399.25	408.50	405.50	92.06	89.30	65.40	390.22	380.60		
20070613	403.00	416.50	415.00	94.94	93.60	69.47	393.58	382.69		
20070614	411.00	420.75	417.50	94.73	93.91	70.45	397.42	384.55	417.50	
20070615	418.50	425.00	424.25	96.64	95.44	72.98	402.00	386.77	424.25	
20070618	419.25	431.00	423.50	93.59	94.99	72.24	406.53	389.30		
20070619	403.50	421.00	403.50	78.41	89.55	55.93	409.00	391.06		
20070620	399.00	412.25	406.25	63.41	78.47	57.36	410.42	392.30		
20070621	395.00	408.00	399.00	47.51	63.11	52.53	411.17	393.71		
20070622	379.00	393.50	381.50	33.80	48.24	43.11	408.44	394.24		
20070625	373.00	381.50	374.00	16.46	32.59	39.81	404.94	394.30		
20070626	374.25	382.00	375.00	4.22	18.16	40.46	400.50	394.30		
20070627	358.00	377.00	362.00	3.55	8.08	35.12	394.33	394.04		
20070628	357.50	365.00	358.25	3.32	3.69	33.74	387.00	392.94		
20070629	344.00	363.00	350.75	4.75	3.87	31.10	378.92	391.32		
20070702	344.50	353.00	350.00	5.23	4.43	30.84	372.97	389.75		
20070703	336.00	347.00	338.00	5.59	5.19	26.96	365.39	387.61		338.00
20070705	339.50	345.50	342.50	5.28	5.36	30.49	359.11	385.69		
20070706	345.00	352.50	352.00	8.60	6.49	37.38	355.83	384.30		
20070709	344.50	351.75	350.25	13.48	9.12	36.66	353.19	382.24		
20070710	350.50	359.00	357.00	20.38	14.15	41.35	351.19	380.56		
20070711	353.75	359.25	355.50	23.80	19.22	40.63	350.47	378.15		
20070712	353.50	365.50	365.25	35.16	26.45	47.08	351.25	376.24		
20070713	360.50	371.00	368.50	49.54	36.17	49.07	353.22	374.02		
20070716	348.50	351.00	348.50	49.57	44.75	39.29	353.06	370.74		
20070717	331.50	347.50	336.75	36.45	45.19	34.89	352.92	366.57		
20070718	335.50	343.00	342.50	22.19	36.07	38.52	352.92	362.71		
20070719	331.50	339.50	336.25	17.14	25.26	36.16	351.17	359.51		
20070720	330.50	342.50	333.50	15.76	18.36	35.14	349.31	356.05		
20070723	324.50	330.00	325.50	7.19	13.36	32.29	345.81	352.55		
20070724	325.50	332.25	326.75	4.80	9.25	33.20	342.61	349.94		
20070725	326.25	331.75	327.25	4.30	5.43	33.59	338.39	347.71		
20070726	329.00	340.50	333.00	9.68	6.26	38.02	334.44	345.71		
20070727	331.00	337.50	336.50	16.67	10.22	40.61	333.11	344.50		
20070730	329.00	340.50	340.00	25.81	17.38	43.18	333.47	343.63		
20070731	338.00	342.75	342.25	32.44	24.97	44.83	333.44	343.23		
20070801	333.00	344.25	336.00	32.08	30.11	41.25	333.42	342.56		
20070802	339.00	344.50	341.25	42.04	35.52	45.20	334.28	342.71		
20070803	338.50	346.00	343.00	56.12	43.41	46.50	336.22	342.74		
20070806	333.00	344.00	343.00	76.56	58.24	46.50	338.03	342.31		
20070807	340.00	352.50	352.00	88.23	73.64	53.11	340.78	342.39		
20070808	353.50	359.25	358.00	93.55	86.12	56.92	343.56	342.44		
20070809	348.00	360.00	348.75	87.64	89.81	50.14	344.92	342.12		
20070810	341.25	353.50	350.50	79.06	86.75	51.33	346.08	341.42		
20070813	348.00	355.00	349.00	69.39	78.70	50.23	346.83	340.49		
20070814	341.75	352.50	345.00	63.83	70.76	47.32	347.83	340.32		
20070815	341.50	351.00	345.25	57.15	63.46	47.52	348.28	340.73		
20070816	326.50	340.25	339.00	47.12	56.03	43.03	347.83	340.56		
20070817	336.25	346.00	345.75	49.07	51.11	48.68	348.14	341.01		
20070820	342.25	349.25	348.75	53.73	49.97	51.00	347.78	341.74		
20070821	347.50	357.25	355.00	69.65	57.48	55.52	347.44	343.14		
20070822	357.75	365.00	364.25	83.18	68.85	61.22	349.17	344.93		
20070823	360.50	372.00	362.00	87.05	79.96	59.23	350.44	346.58		
20070824	358.00	362.50	358.75	82.32	84.18	56.38	351.53	347.81		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20070827	348.50	354.25	353.00	69.05	79.47	51.65	352.42	348.60		
20070828	343.00	353.75	344.75	56.41	69.26	45.72	352.36	348.82		
20070829	339.00	346.75	340.25	42.86	56.11	42.83	352.50	348.73		
20070830	338.25	348.00	339.75	33.15	44.14	42.51	351.83	348.90		
20070831	339.00	346.00	340.00	29.67	35.23	42.74	350.86	348.85		
20070904	344.00	357.25	353.25	39.19	34.00	53.44	350.67	349.33		
20070905	345.00	357.00	345.75	43.59	37.48	47.97	348.61	349.46		
20070906	337.50	341.50	339.25	36.50	39.76	43.79	346.08	348.86		
20070907	335.50	349.25	347.50	27.86	35.98	49.77	344.83	348.36		
20070910	342.50	349.25	346.00	23.35	29.23	48.76	344.06	348.23		
20070911	338.50	345.00	341.25	25.80	25.67	45.59	343.67	347.79		
20070912	338.50	358.75	356.50	34.02	27.72	55.58	345.47	348.14		
20070913	343.75	358.50	346.75	38.32	32.71	49.34	346.25	348.23		
20070914	345.25	354.25	349.00	52.42	41.59	50.72	347.25	348.40		
20070917	349.25	354.25	352.25	57.26	49.33	52.71	347.14	349.04		
20070918	344.25	354.00	352.25	67.38	59.02	52.71	347.86	349.35		
20070919	347.25	358.75	358.25	80.65	68.43	56.49	349.97	349.80		
20070920	366.00	375.00	369.25	85.11	77.71	62.41	352.39	350.48		
20070921	371.25	377.00	376.50	94.03	86.60	65.72	355.78	351.06		
20070924	370.75	380.00	373.50	89.88	89.67	63.24	359.36	351.61		
20070925	371.25	375.50	371.75	88.55	90.82	61.77	361.06	352.23		
20070926	370.75	376.00	375.00	85.21	87.88	63.47	364.19	353.27		
20070927	380.00	389.50	386.75	88.28	87.34	68.84	368.39	355.27		
20070928	370.00	385.50	373.00	83.67	85.72	58.07	370.69	356.83		
20071001	368.00	375.75	368.75	73.86	81.94	55.20	372.53	358.21		
20071002	348.75	360.50	348.75	45.96	67.83	44.13	371.47	358.63		
20071003	342.25	351.25	344.50	25.00	48.27	42.19	368.72	358.21		
20071004	341.00	348.50	342.25	6.09	25.68	41.16	364.92	358.05		
20071005	339.75	343.75	342.25	4.12	11.74	41.16	361.44	358.19		
20071008	335.00	340.00	339.75	5.44	5.22	39.91	357.89	357.82		
20071009	339.50	348.50	342.50	9.17	6.24	42.00	354.28	357.65		
20071010	344.75	348.50	347.25	14.98	9.86	45.54	349.89	357.94		
20071011	341.50	348.00	343.75	17.43	13.86	43.44	346.64	357.33		
20071012	347.75	357.50	351.00	22.63	18.35	48.71	344.67	357.54		
20071015	354.00	362.50	362.00	31.65	23.90	55.49	346.14	358.15		
20071016	354.75	361.75	360.50	41.90	32.06	54.43	347.92	358.55		
20071017	355.50	360.25	358.00	47.29	40.28	52.64	349.67	358.82		
20071018	362.50	367.50	367.25	57.16	48.78	58.15	352.44	359.25		
20071019	364.00	371.00	370.25	74.20	59.55	59.78	355.83	359.30		
20071022	359.00	366.75	364.50	86.33	72.56	55.32	358.28	358.73		
20071023	359.50	368.50	361.00	84.03	81.52	52.74	359.81	358.13		
20071024	355.75	361.25	356.50	71.30	80.55	49.54	361.22	357.40		
20071025	359.25	367.00	366.25	72.92	76.08	55.80	362.92	356.99		
20071026	369.50	374.50	372.00	79.79	74.67	59.02	364.03	356.29		
20071029	375.00	378.75	376.00	90.76	81.16	61.15	365.75	356.43		
20071030	368.75	373.50	370.25	87.55	86.04	56.61	367.11	356.50		
20071031	370.50	380.00	375.50	85.28	87.86	59.56	368.03	357.77		
20071101	367.00	374.50	368.75	73.32	82.05	54.43	367.86	358.93		
20071102	370.75	380.75	377.00	76.12	78.24	59.07	369.25	360.58		
20071105	372.00	377.50	375.25	73.51	74.32	57.73	370.83	362.15		
20071106	379.00	387.50	385.75	86.09	78.57	63.14	374.08	364.35		
20071107	382.25	390.50	384.25	84.91	81.50	61.92	376.08	366.33		
20071108	385.00	390.00	389.50	91.21	87.40	64.51	378.03	368.35		
20071109	380.50	389.00	386.75	89.45	88.52	62.13	379.22	370.39		
20071112	378.00	382.00	379.00	84.41	88.36	55.87	380.19	371.73		
20071113	374.25	381.50	374.75	68.57	80.81	52.74	380.11	372.33		
20071114	377.00	385.00	383.00	61.53	71.50	57.70	381.69	373.40		
20071115	374.50	381.00	374.75	50.22	60.11	51.84	381.44	374.20		
20071116	377.50	381.50	379.50	51.42	54.39	54.69	381.92	374.79		
20071119	376.50	383.50	377.50	43.62	48.42	53.26	381.00	375.13		
20071120	378.50	385.75	381.25	52.84	49.29	55.61	380.67	375.93		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20071121	377.75	382.25	382.00	54.09	50.18	56.08	379.83	376.93		
20071123	383.50	389.75	389.00	69.83	58.92	60.34	380.08	378.48		
20071126	382.25	391.75	385.75	71.52	65.15	57.55	380.83	379.40		
20071127	381.50	383.75	383.50	70.15	70.50	55.63	381.81	379.95		
20071128	380.50	387.50	387.25	64.29	68.65	58.14	382.28	380.49		
20071129	382.50	390.00	383.50	60.00	64.81	54.80	383.25	381.12		
20071130	378.00	387.50	384.50	61.90	62.06	55.54	383.81	381.55		
20071203	382.50	392.00	386.00	59.21	60.37	56.67	384.75	382.37		
20071204	388.50	395.75	394.00	72.18	64.43	62.21	386.17	383.18		
20071205	390.75	396.00	394.00	82.89	71.42	62.21	387.50	384.07		
20071206	391.50	395.25	394.75	92.02	82.36	62.72	388.14	384.50		
20071207	394.50	400.00	399.50	94.05	89.65	65.91	389.67	385.23		
20071210	398.25	402.25	400.50	94.77	93.61	66.56	391.56	385.75		
20071211	399.00	407.75	406.50	95.52	94.78	70.22	393.69	386.69	406.50	
20071212	407.00	417.25	416.75	95.81	95.37	75.21	397.39	388.49	416.75	
20071213	412.50	422.00	418.75	95.72	95.68	76.05	401.19	390.58	418.75	
20071214	416.75	420.50	420.00	95.6	95.71	76.58	404.97	392.35	420.00	
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2008

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20071203	428.00	434.75	431.50							
20071204	433.75	438.75	437.50							
20071205	434.25	438.75	435.75							
20071206	433.75	437.25	436.50							
20071207	436.00	441.00	440.50							
20071210	438.00	441.75	439.75							
20071211	438.00	443.00	442.25							
20071212	443.25	449.75	449.25							
20071213	445.00	452.50	450.75				440.42			
20071214	448.00	451.50	450.50				442.53			
20071217	443.00	451.00	450.50				443.97			
20071218	444.00	449.00	448.25				445.36			
20071219	450.50	454.00	452.00				447.08			
20071220	449.25	454.75	454.50				448.64			
20071221	455.00	466.50	462.50				451.17			
20071224	461.00	463.00	462.50	91.55		85.71	453.42			
20071226	465.00	473.00	470.00	89.31		88.39	455.72			
20071227	468.75	474.75	474.50	93.17	91.34	89.65	458.36			
20071228	472.50	476.00	473.00	94.61	92.36	86.30	460.86			
20071231	469.75	474.50	473.50	94.96	94.24	86.48	463.42			
20080102	478.50	486.00	480.25	90.72	93.43	88.66	466.97	453.13	480.25	
20080103	480.00	486.25	485.75	92.96	92.88	90.07	470.72	455.71	485.75	
20080104	481.00	488.00	486.75	94.23	92.64	90.30	474.31	458.06	486.75	
20080107	482.75	488.00	485.75	97.02	94.74	88.05	476.89	460.44	485.75	
20080108	490.00	499.00	496.00	95.59	95.61	90.63	480.61	463.27	496.00	
20080109	493.50	498.50	495.00	93.84	95.48	88.62	483.39	465.87	495.00	
20080110	490.00	496.00	493.25	91.65	93.69	85.07	485.47	468.42	493.25	
20080111	512.50	513.25	513.25	93.47	92.98	90.00	489.94	471.80	513.25	
20080114	525.00	533.25	530.50	94.88	93.33	92.35	496.28	475.67	530.50	
20080115	525.00	540.00	529.00	93.84	94.06	90.36	501.69	479.39	529.00	
20080116	518.00	525.00	521.25	85.07	91.26	80.70	505.64	482.76	521.25	
20080117	519.00	531.75	521.00	77.32	85.41	80.41	509.44	486.12	521.00	
20080118	510.25	521.50	515.00	70.35	77.58	73.39	512.69	489.30	515.00	
20080122	495.00	510.75	504.00	59.61	69.09	62.60	513.58	491.77		
20080123	484.00	503.00	484.00	37.51	55.82	48.61	512.36	493.18		
20080124	491.50	504.00	502.50	28.19	41.77	57.97	513.39	495.08		
20080125	507.50	516.00	509.75	30.09	31.93	60.97	513.00	497.33		
20080128	501.75	512.75	510.50	43.64	33.97	61.28	510.78	499.26		
20080129	507.50	515.00	510.75	47.42	40.38	61.39	508.75	500.99		
20080130	506.75	512.00	510.00	47.17	46.08	60.83	507.50	502.75		
20080131	505.00	519.75	515.75	50.30	48.30	63.55	506.92	504.76		
20080201	517.50	526.50	519.00	55.21	50.89	65.03	507.36	506.61		
20080204	523.50	533.50	533.00	68.90	58.13	70.57	510.58	508.86		
20080205	527.50	533.50	532.50	82.66	68.92	70.14	515.97	511.04		
20080206	525.00	548.75	525.75	83.32	78.29	64.47	518.56	512.94		
20080207	514.00	525.00	522.50	73.97	79.98	61.87	519.97	514.20		
20080208	526.00	536.50	530.00	64.99	74.10	65.34	522.14	515.87		
20080211	515.50	526.00	525.25	64.74	67.90	61.52	523.75	517.39		
20080212	516.75	528.00	520.25	61.66	63.80	57.70	524.89	517.73		
20080213	515.00	520.00	519.25	50.39	58.93	56.94	525.28	517.19		
20080214	524.25	534.50	532.25	50.78	54.27	63.66	526.75	517.35		
20080215	532.75	538.75	538.00	59.19	53.45	66.17	527.31	518.14		
20080219	540.00	547.50	545.00	77.25	62.41	68.98	528.69	519.29		
20080220	539.50	548.25	548.00	88.38	74.94	70.13	531.17	520.86	548.00	
20080221	542.50	553.25	553.00	96.36	87.33	71.99	534.56	523.19	553.00	
20080222	545.50	551.75	550.25	96.67	93.80	69.43	536.81	526.35		
20080225	553.00	563.50	557.25	93.03	95.35	72.14	540.36	528.95	557.25	
20080226	540.75	559.50	556.50	88.53	92.74	71.41	544.39	531.18	556.50	
20080227	546.00	556.50	553.50	84.34	88.63	68.42	548.19	533.23		
20080228	549.00	566.00	565.50	88.23	87.03	73.24	551.89	535.83	565.50	
20080229	561.00	568.00	564.75	90.90	87.82	72.50	554.86	538.44	564.75	

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20080303	575.50	582.50	576.00	94.42	91.18	76.38	558.31	541.31	576.00	
20080304	556.25	580.00	567.25	87.22	90.84	68.31	560.44	543.61		
20080305	569.50	584.00	577.25	85.49	89.04	71.95	563.14	545.71	577.25	
20080306	570.25	581.25	579.25	85.61	86.11	72.63	566.36	547.94	579.25	
20080307	559.25	568.50	559.25	74.61	81.90	57.62	566.58	549.54		
20080310	541.00	579.25	579.00	74.63	78.28	65.26	569.08	552.23		
20080311	573.50	590.00	585.50	74.67	74.63	67.34	572.64	554.87		
20080312	577.00	585.00	579.00	85.76	78.35	63.25	574.14	557.43		
20080313	579.00	590.00	583.25	84.94	81.79	64.76	576.19	560.43		
20080314	564.00	587.50	575.00	77.83	82.85	59.65	576.08	563.08		
20080317	555.00	566.00	555.00	61.47	74.75	49.45	574.72	564.17		
20080318	551.00	563.75	561.25	46.48	61.93	52.20	572.94	565.27		
20080319	541.25	547.50	541.25	23.47	43.81	43.96	568.72	565.10		
20080320	521.25	532.00	521.25	13.95	27.97	37.57	564.50	563.82		
20080324	525.50	540.50	539.75	9.14	15.52	45.47	560.14	563.19		
20080325	549.75	559.75	559.75	27.64	16.91	52.46	557.28	563.64		
20080326	561.00	575.00	568.50	50.55	29.11	55.17	556.11	564.18		
20080327	562.50	571.50	568.50	64.48	47.56	55.17	554.47	564.75		
20080328	562.50	578.00	576.75	72.73	62.59	57.80	554.67	565.86		
20080331	570.00	601.00	581.00	74.79	70.67	59.13	557.56	566.60		
20080401	574.00	595.50	593.00	81.87	76.46	62.71	561.08	567.94		
20080402	598.00	605.00	603.00	87.50	81.39	65.42	567.94	569.23		
20080403	600.00	612.00	610.25	95.22	88.20	67.28	577.83	571.27		
20080404	605.75	610.25	608.75	97.37	93.36	66.49	585.50	572.77		
20080407	601.50	613.00	603.50	94.71	95.77	63.65	590.36	573.93		
20080408	601.00	607.00	603.50	91.90	94.66	63.65	594.25	576.04		
20080409	605.50	628.50	620.00	90.46	92.36	68.54	599.97	577.99		
20080410	609.75	625.50	611.25	88.32	90.23	63.65	603.81	579.21		
20080411	601.00	612.50	604.00	81.41	86.73	59.83	606.36	580.40		
20080414	608.25	615.00	613.25	76.52	82.08	62.89	608.61	581.83		
20080415	618.25	628.75	625.25	80.34	79.42	66.45	611.08	584.23		
20080416	622.00	629.00	625.75	89.08	81.98	66.60	612.81	587.60		
20080417	620.50	631.75	626.00	93.51	87.64	66.68	614.72	590.68		
20080418	613.50	624.50	622.75	90.07	90.89	64.59	616.86	594.56		
20080421	593.50	611.00	605.25	68.61	84.06	54.67	617.06	598.56		
20080422	611.50	624.50	619.00	60.60	73.09	59.88	616.94	602.33		
20080423	611.25	622.00	612.50	49.02	59.41	56.57	617.08	604.85		
20080424	597.00	614.00	602.00	46.19	51.94	51.61	616.86	606.44		
20080425	603.00	619.00	606.75	35.51	43.57	53.59	616.14	608.26		
20080428	614.50	631.00	630.25	50.98	44.23	61.91	616.69	610.81		
20080429	619.00	637.50	622.00	65.16	50.55	57.98	616.28	612.76		
20080430	620.50	631.00	628.25	79.94	65.36	60.05	616.53	614.44		
20080501	617.00	632.00	631.50	76.70	73.94	61.12	617.50	615.80		
20080502	626.00	637.75	629.50	82.23	79.63	60.06	620.19	616.71		
20080505	605.00	633.25	612.75	70.41	76.45	51.88	619.50	616.90		
20080506	619.00	637.00	623.50	64.22	72.29	56.02	620.72	617.86		
20080507	626.00	634.50	630.50	64.97	66.53	58.52	623.89	619.14		
20080508	634.50	649.00	646.25	82.15	70.45	63.54	628.28	620.39		
20080509	643.50	655.00	650.00	90.01	79.05	64.64	630.47	622.24		
20080512	637.00	648.00	637.75	85.56	85.91	58.45	632.22	623.85		
20080513	617.00	631.00	631.00	73.42	83.00	55.30	632.53	624.69		
20080514	619.50	627.00	620.50	54.18	71.05	50.73	631.31	624.46		
20080515	609.50	623.50	622.50	42.42	56.67	51.55	630.53	624.31		
20080516	614.00	632.00	616.75	30.72	42.44	49.02	630.97	623.87		
20080519	609.50	619.00	613.00	24.83	32.66	47.39	629.81	623.40		
20080520	614.75	629.00	616.00	20.50	25.35	48.86	628.19	623.92		
20080521	617.50	634.50	633.50	31.67	25.67	56.49	626.78	624.61		
20080522	622.25	632.50	623.25	38.50	30.22	51.63	623.81	625.12		
20080523	622.00	629.00	627.25	44.17	38.11	53.32	622.64	626.32		
20080527	621.00	627.50	625.50	36.89	39.85	52.45	622.03	627.21		
20080528	612.75	623.50	619.50	32.05	37.70	49.50	621.92	626.70		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20080529	599.75	621.00	609.50	24.93	31.29	44.95	620.47	626.11		
20080530	607.00	630.00	626.50	31.69	29.56	52.88	621.56	626.02		
20080602	625.00	644.75	643.25	56.58	37.73	59.12	624.92	626.58		
20080603	630.00	646.00	636.25	77.01	55.09	55.79	627.17	626.90		
20080604	633.00	643.25	643.00	89.70	74.43	58.23	628.22	628.35		
20080605	650.50	671.00	670.75	90.69	85.80	66.44	633.50	630.60		
20080606	673.50	690.50	677.75	93.04	91.14	68.14	639.11	632.85		
20080609	684.50	693.50	685.25	92.27	92.00	69.90	645.75	634.70		
20080610	684.50	703.50	702.75	92.14	92.48	73.57	655.00	637.21	702.75	
20080611	715.00	732.75	732.75	96.83	93.74	78.42	668.69	641.74	732.75	
20080612	727.00	755.00	739.50	96.43	95.13	79.34	681.25	646.90	739.50	
20080613	732.00	769.00	765.00	95.88	96.38	82.39	694.78	653.79	765.00	
20080616	758.00	791.00	765.00	91.35	94.56	82.39	709.08	660.57	765.00	
20080617	759.00	777.50	776.00	92.07	93.10	83.60	723.86	668.15	776.00	
20080618	766.25	785.00	780.00	90.86	91.43	84.03	736.00	676.11	780.00	
20080619	751.25	771.50	761.50	89.47	90.80	74.32	745.31	683.04	761.50	
20080620	751.50	771.50	755.50	84.73	88.35	71.44	753.11	688.85	755.50	
20080623	739.50	761.00	759.25	80.03	84.74	72.16	759.39	695.32	759.25	
20080624	744.00	764.00	747.50	75.63	80.13	66.45	761.03	701.05		
20080625	746.00	766.00	765.00	75.61	77.09	70.23	763.86	707.69	765.00	
20080626	778.00	795.00	788.00	80.19	77.14	74.32	766.42	715.71	788.00	
20080627	782.00	796.00	787.00	87.82	81.21	73.85	768.86	724.17	787.00	
20080630	757.00	776.00	757.00	79.15	82.39	61.20	766.75	730.38		
20080701	736.25	754.50	752.00	60.00	75.66	59.38	763.64	735.56		
20080702	747.00	782.00	780.50	54.62	64.59	65.66	765.75	742.43		
20080703	762.00	782.50	777.00	60.07	58.23	64.35	768.14	748.81		
20080707	747.00	747.00	747.00	53.99	56.23	54.30	766.78	752.44		
20080708	702.00	728.50	722.50	36.00	50.02	47.74	764.00	754.57		
20080709	704.75	716.50	712.75	17.08	35.69	45.39	758.19	755.88		
20080710	701.00	711.00	704.25	12.22	21.77	43.39	748.89	755.95		
20080711	695.00	714.00	709.25	9.66	12.99	44.93	740.25	754.83		
20080714	680.50	693.25	682.25	6.35	9.41	38.79	731.94	752.11		
20080715	661.50	688.50	666.75	6.51	7.50	35.77	722.47	747.43		
20080716	657.50	679.00	677.25	6.56	6.47	39.22	711.00	743.25		
20080717	648.00	679.00	650.00	6.50	6.52	34.10	696.89	737.25		
20080718	627.00	654.50	628.50	5.53	6.20	30.69	683.72	730.04		
20080721	603.00	624.00	608.25	1.75	4.59	27.87	671.03	722.74		608.25
20080722	590.00	604.50	592.25	1.69	2.99	25.84	657.64	714.96		592.25
20080723	563.00	607.00	590.50	5.54	2.99	25.62	645.00	706.93		590.50
20080724	580.75	599.00	592.00	9.82	5.68	26.20	631.97	699.52		592.00
20080725	589.00	604.00	596.50	16.18	10.51	28.01	622.44	691.50		596.50
20080728	594.50	604.50	601.25	20.31	15.43	29.96	615.17	682.61		601.25
20080729	590.00	616.25	613.50	26.20	20.90	34.85	608.08	674.35		
20080730	608.00	622.00	621.25	32.31	26.27	37.82	604.89	667.88		
20080731	606.00	619.50	607.50	35.39	31.30	34.79	602.56	661.00		
20080801	582.00	608.00	585.00	30.09	32.60	30.50	599.97	651.69		
20080804	555.00	577.50	555.50	17.37	27.62	25.97	595.89	641.14		555.50
20080805	539.00	566.50	545.00	7.41	18.29	24.57	590.83	631.52		545.00
20080806	522.75	549.00	527.75	2.83	9.20	22.43	583.69	622.25		527.75
20080807	532.50	544.50	542.00	9.03	6.42	28.00	577.64	614.12		542.00
20080808	514.00	526.25	518.25	8.91	6.92	24.81	568.42	605.26		518.25
20080811	516.00	524.00	517.00	8.58	8.84	24.65	557.69	596.11		517.00
20080812	505.00	531.00	528.50	8.93	8.81	29.16	547.39	588.79		528.50
20080813	532.50	558.50	558.50	22.86	13.46	39.36	541.94	583.63		
20080814	550.00	579.00	577.25	42.52	24.77	44.72	541.08	578.87		
20080815	547.25	560.50	549.50	48.50	37.96	39.20	540.42	574.08		
20080818	560.00	579.00	572.75	52.56	47.86	45.30	543.50	571.43		
20080819	561.75	592.00	584.50	55.12	52.06	48.13	549.81	570.30		
20080820	586.00	597.50	595.00	71.57	59.75	50.59	555.69	570.43		
20080821	609.00	625.00	617.50	83.52	70.07	55.46	566.72	571.71		
20080822	602.00	612.00	606.50	88.57	81.22	52.72	576.67	572.40		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20080825	599.00	623.00	600.00	85.83	85.97	51.12	584.61	572.57		
20080826	589.75	600.00	594.00	79.31	84.57	49.61	588.56	572.23		
20080827	585.75	602.50	596.00	76.39	80.51	50.14	590.64	571.39		
20080828	581.25	591.00	587.75	72.99	76.23	47.92	594.89	569.80		
20080829	582.00	599.50	585.00	70.49	73.29	47.17	596.25	568.73		
20080902	556.00	571.00	569.25	58.45	67.31	43.01	594.56	567.98		
20080903	550.25	564.50	562.25	41.90	56.94	41.27	590.92	568.30		
20080904	556.50	570.00	564.50	27.07	42.47	42.08	585.03	569.23		
20080905	542.75	552.00	548.50	16.16	28.37	38.06	578.58	570.21		
20080908	544.00	555.00	549.00	12.26	18.49	38.26	572.92	570.55		
20080909	531.50	549.50	544.50	9.50	12.64	37.10	567.42	571.80		
20080910	535.50	544.50	536.75	9.04	10.27	35.14	560.83	572.74		
20080911	531.50	538.25	533.25	7.14	8.56	34.25	554.78	572.96		
20080912	548.00	563.25	563.25	14.08	10.09	46.63	552.36	573.19		
20080915	548.00	574.50	562.00	26.52	15.91	46.24	551.56	572.46		
20080916	532.00	556.00	532.25	26.24	22.28	38.07	548.22	571.64		
20080917	527.00	559.75	554.00	27.09	26.62	45.63	547.06	570.75		
20080918	524.00	557.50	527.25	14.20	22.51	39.28	544.69	568.02		
20080919	533.00	548.00	542.25	25.89	22.39	43.99	543.94	565.51		
20080922	554.00	564.50	558.50	36.25	25.45	48.64	545.50	562.70		
20080923	551.00	561.00	560.25	58.75	40.30	49.13	548.11	560.50		
20080924	555.50	572.50	563.00	72.44	55.81	49.93	551.42	558.74		
20080925	556.00	565.00	558.25	72.28	67.82	48.50	550.86	557.04		
20080926	539.50	553.50	543.00	60.89	68.54	44.12	548.75	554.51		
20080929	513.00	524.00	513.00	35.15	56.11	37.04	546.61	550.95		
20080930	485.50	513.00	487.50	13.29	36.44	32.30	539.22	546.31		
20081001	483.00	496.50	484.00	1.11	16.52	31.70	534.42	542.25		
20081002	454.00	478.00	454.00	1.11	5.17	27.06	524.61	537.10		454.00
20081003	453.00	467.75	454.00	0.64	0.96	27.06	513.00	531.83		454.00
20081006	424.00	430.75	424.00	0.28	0.68	23.13	497.86	525.90		424.00
20081007	413.00	429.50	417.00	1.11	0.68	22.32	481.64	519.62		417.00
20081008	408.00	429.50	427.50	4.79	2.06	26.50	467.11	514.05		427.50
20081009	430.50	442.50	438.25	10.92	5.61	30.61	455.47	509.36		
20081010	408.25	410.00	408.25	10.13	8.61	26.20	443.83	503.40		408.25
20081013	409.00	422.50	411.50	6.89	9.31	27.42	435.39	496.18		411.50
20081014	410.50	423.50	411.25	1.45	6.16	27.38	427.31	489.00		411.25
20081015	385.00	406.00	388.00	1.99	3.44	24.09	419.97	482.13		388.00
20081016	371.50	391.50	384.50	4.13	2.52	23.62	412.25	474.06		384.50
20081017	389.00	409.00	403.00	10.86	5.66	31.13	409.92	468.14		
20081020	406.50	420.00	418.50	22.80	12.59	36.74	410.08	462.25		
20081021	406.75	418.00	411.00	32.32	21.99	35.25	408.25	455.23		
20081022	382.00	391.00	385.00	29.57	28.23	30.59	402.33	446.88		
20081023	383.50	401.50	390.25	25.84	29.24	32.53	400.33	438.65		
20081024	372.50	392.00	372.75	14.06	23.16	29.57	396.03	429.82		372.75
20081027	368.75	386.75	385.25	16.85	18.92	34.18	393.14	422.31		
20081028	386.00	407.00	390.75	17.99	16.30	36.16	393.44	416.49		
20081029	402.00	420.75	420.75	49.06	27.97	45.74	397.47	413.31		
20081030	402.25	416.50	409.50	66.41	44.49	43.13	398.19	409.76		
20081031	395.75	405.50	401.50	76.41	63.96	41.32	396.31	407.26		
20081103	398.00	417.50	403.00	66.70	69.84	41.81	395.42	404.83		
20081104	412.00	421.50	413.00	69.86	70.99	45.12	398.53	404.31		
20081105	390.00	415.50	390.25	63.50	66.69	39.60	398.53	403.04		
20081106	374.50	384.50	378.00	47.39	60.25	36.98	399.11	400.68		
20081107	375.00	387.00	375.50	23.70	44.86	36.45	398.03	397.69		
20081110	372.75	385.50	383.50	19.43	30.17	39.44	397.22	396.51		
20081111	360.25	376.00	374.25	21.21	21.44	37.26	392.06	394.74		
20081112	363.25	383.50	369.50	21.97	20.87	36.15	387.61	392.75		
20081113	363.00	378.50	377.00	21.77	21.65	39.22	384.89	392.23		
20081114	371.00	381.50	380.25	25.03	22.93	40.56	382.36	392.02		
20081117	381.00	389.00	385.75	33.88	26.89	42.85	379.33	391.20		
20081118	379.00	386.25	380.00	35.51	31.47	41.07	378.19	389.37		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20081119	375.00	385.00	378.75	34.69	34.69	40.67	378.28	387.83		
20081120	361.00	369.75	363.75	22.72	30.98	36.17	376.97	386.82		
20081121	337.50	360.00	338.50	12.37	23.26	30.13	371.97	384.36		
20081124	347.50	361.00	354.50	9.57	14.89	37.28	369.78	383.49		
20081125	347.00	354.00	353.50	18.02	13.32	37.02	368.00	381.98		
20081126	350.75	357.50	354.00	28.30	18.63	37.25	365.44	380.23		
20081128	346.00	352.00	349.50	28.80	25.04	35.97	362.03	376.83		
20081201	330.00	341.00	332.75	20.00	25.70	31.62	356.14	373.18		
20081202	331.00	338.00	332.50	10.73	19.85	31.56	350.86	369.89		
20081203	329.50	338.00	332.00	4.37	11.70	31.43	345.67	366.51		
20081204	318.00	330.50	318.25	2.93	6.01	27.98	340.61	362.00		318.25
20081205	290.00	310.00	293.50	2.70	3.33	23.07	335.61	357.39		293.50
20081208	310.00	317.00	314.25	9.69	5.11	33.59	331.14	354.36		
20081209	311.00	320.00	312.25	17.38	9.92	33.12	326.56	351.35		
20081210	318.00	328.50	326.75	31.57	19.55	39.71	323.53	348.64		
20081211	325.00	342.00	338.00	45.70	31.55	44.29	322.25	346.92		
20081212	328.00	364.00	359.50	69.2	48.82	51.83	325.22	346.44		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

2009

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20081203	393.00	398.00	394.25							
20081204	379.75	392.00	379.25							
20081205	349.25	368.00	351.25							
20081208	369.00	377.50	373.75							
20081209	369.50	381.00	372.25							
20081210	379.00	388.00	387.25							
20081211	384.75	401.00	396.50							
20081212	385.00	425.25	420.00							
20081215	421.00	437.00	422.50				388.56			
20081216	425.75	443.50	441.50				393.81			
20081217	429.50	449.00	435.25				400.03			
20081218	427.00	435.00	434.75				409.31			
20081219	419.75	428.00	425.00				415.00			
20081222	423.25	427.50	427.00				421.08			
20081223	427.25	439.00	439.75				426.92			
20081224	436.75	441.00	441.50	87.05		70.18	431.92			
20081226	442.25	457.50	456.50	94.03		73.01	435.97			
20081229	437.50	464.00	438.25	88.03	89.70	64.94	437.72			
20081230	433.00	442.00	440.75	81.42	87.83	65.50	437.64			
20081231	435.50	450.00	451.50	76.54	82.00	67.89	439.44			
20090102	446.50	457.00	456.25	82.35	80.11	68.91	441.83	418.33		
20090105	448.50	458.50	455.25	84.88	81.26	68.42	445.19	421.24		
20090106	457.75	471.50	471.25	89.98	85.74	71.89	450.11	425.62	471.25	
20090107	458.00	463.50	460.50	86.16	87.01	66.59	452.42	430.82		
20090108	450.00	459.50	450.25	79.07	85.07	61.91	453.39	434.46		
20090109	452.00	459.50	454.25	68.12	77.78	63.00	453.14	438.37		
20090112	424.25	429.50	424.25	42.56	63.25	51.14	451.58	440.13		
20090113	407.50	421.75	407.00	22.65	44.44	45.80	447.83	440.63		
20090114	404.50	413.00	411.50	3.91	23.04	47.34	443.39	440.23		
20090115	405.00	414.50	411.00	6.46	11.01	47.18	438.36	439.68		
20090116	419.00	437.00	436.75	22.76	11.04	55.56	436.31	439.45		
20090120	424.50	447.50	430.00	31.97	20.39	53.18	431.72	439.20		
20090121	424.00	434.50	435.75	44.28	33.00	54.95	428.97	439.25		
20090122	424.50	433.75	433.50	42.66	39.64	54.09	427.11	439.65		
20090123	430.50	445.00	436.00	45.65	44.20	54.93	425.08	440.08		
20090126	437.00	445.50	439.00	47.26	45.19	55.98	426.72	440.05		
20090127	422.50	432.00	423.00	43.29	45.40	49.38	428.50	439.17		
20090128	419.00	430.25	430.00	43.07	44.54	52.05	430.56	437.90		
20090129	424.50	428.25	427.25	39.69	42.02	50.91	432.36	437.38		
20090130	425.00	430.00	425.00	45.13	42.63	49.96	431.06	436.63		
20090202	410.00	418.50	416.00	38.59	41.14	46.21	429.50	434.94		
20090203	401.75	411.00	406.25	28.08	37.27	42.49	426.22	432.56		
20090204	401.50	412.25	401.75	12.37	26.35	40.86	422.69	430.01		
20090205	403.75	415.00	415.25	13.42	17.96	47.39	420.39	427.35		
20090206	416.25	423.50	421.75	24.82	16.87	50.24	418.47	425.50		
20090209	421.50	426.75	421.75	39.98	26.07	50.24	418.33	424.14		
20090210	413.00	423.50	420.50	44.41	36.40	49.64	417.28	422.54		
20090211	409.75	419.00	410.00	36.17	40.19	44.80	415.36	421.86		
20090212	407.50	417.50	407.75	25.57	35.38	43.82	413.44	421.89		
20090213	405.50	410.25	405.50	15.55	25.76	42.80	412.28	421.61		
20090217	388.00	398.75	390.25	10.88	17.33	36.62	410.50	420.62		
20090218	386.00	391.25	387.50	7.28	11.24	35.62	408.92	418.27		
20090219	390.75	395.50	393.75	8.78	8.98	39.65	406.53	416.55		
20090220	382.00	391.50	389.75	12.78	9.62	38.01	402.97	414.36		
20090223	390.00	396.50	391.50	18.72	13.43	39.19	399.61	412.36		
20090224	386.75	394.00	394.25	21.97	17.82	41.10	396.69	410.37		
20090225	390.75	407.75	403.75	32.40	24.37	47.25	396.00	408.69		
20090226	398.00	410.00	402.25	40.41	31.60	46.43	395.39	407.70		
20090227	389.00	397.00	391.00	37.99	36.93	40.69	393.78	405.85		
20090302	375.50	382.00	380.25	25.09	34.49	36.10	392.67	403.61		
20090303	378.25	383.50	380.75	14.03	25.70	36.46	391.92	401.50		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20090304	387.50	395.00	393.75	21.81	20.31	45.10	391.92	400.44		
20090305	386.50	391.50	387.75	30.26	22.03	42.24	391.69	399.56		
20090306	389.50	394.00	390.75	40.97	31.01	44.15	391.61	399.04		
20090309	395.50	399.50	396.00	46.29	39.17	47.41	391.81	398.12		
20090310	406.00	412.50	406.75	62.69	49.98	53.42	392.14	397.40		
20090311	395.00	410.25	396.00	66.43	58.47	47.57	391.44	396.18		
20090312	399.75	417.50	415.75	78.57	69.23	56.91	394.19	395.95		
20090313	413.50	419.00	418.00	82.98	75.99	57.83	398.39	396.33		
20090316	418.00	426.75	421.25	94.27	85.27	59.19	402.89	396.98		
20090317	419.00	424.00	420.75	91.75	89.67	58.87	405.89	397.70		
20090318	416.00	421.50	418.75	87.32	91.11	57.56	409.33	399.06		
20090319	426.00	434.00	428.25	87.62	88.90	61.91	413.50	401.00		
20090320	426.75	429.50	428.00	87.93	87.62	61.73	417.06	402.63		
20090323	425.00	434.50	427.25	88.10	87.88	61.16	419.33	404.42		
20090324	424.00	428.00	425.25	84.95	87.00	59.57	422.58	406.02		
20090325	416.75	421.00	417.50	75.95	83.00	53.75	422.78	407.13		
20090326	420.00	423.50	422.75	71.07	77.32	56.83	423.31	408.04		
20090327	417.25	420.50	419.25	64.62	70.55	54.24	423.08	408.85		
20090330	411.50	419.00	418.25	63.50	66.40	53.49	422.81	410.14		
20090331	414.00	436.75	435.75	72.52	66.88	63.11	424.69	412.79		
20090401	424.00	432.00	427.25	72.84	69.62	56.95	424.58	415.00		
20090402	431.00	437.50	433.75	81.75	75.70	60.15	425.22	416.90		
20090403	429.00	435.50	435.50	80.09	78.23	60.99	426.14	419.18		
20090406	432.25	437.00	436.75	91.67	84.50	61.61	427.42	421.37		
20090407	426.75	434.50	427.50	83.65	85.14	54.65	428.53	422.87		
20090408	423.00	433.00	427.75	73.72	83.01	54.80	429.08	423.87		
20090409	421.00	435.50	421.75	54.49	70.62	50.52	429.36	425.10		
20090413	415.00	420.50	419.25	43.91	57.37	48.81	429.47	425.26		
20090414	419.50	428.25	424.75	40.06	46.15	52.61	428.25	425.58		
20090415	415.25	422.50	415.25	31.73	38.57	46.23	426.92	425.30		
20090416	412.00	417.00	416.75	28.53	33.44	47.31	425.03	425.11		
20090417	406.50	417.75	407.00	12.08	24.11	41.45	421.86	424.55		
20090420	390.50	400.50	398.75	13.12	17.91	37.24	417.64	423.14		
20090421	399.50	408.00	403.50	15.61	13.60	40.95	414.97	421.98		
20090422	400.00	407.00	403.25	24.11	17.61	40.82	412.25	420.83		
20090423	406.50	411.50	411.50	33.32	24.35	47.11	411.11	420.18		
20090424	404.75	416.25	406.75	35.75	31.06	44.19	409.72	419.67		
20090427	396.00	404.00	401.50	34.85	34.64	41.17	407.14	418.65		
20090428	400.25	406.00	404.25	29.98	33.53	43.36	405.92	417.94		
20090429	407.75	422.25	421.75	41.48	35.44	54.87	406.47	418.11		
20090430	415.75	427.75	423.25	62.25	44.57	55.70	408.28	417.51		
20090501	423.50	434.50	433.25	84.45	62.73	60.87	412.11	417.80		
20090504	420.75	432.00	425.50	87.82	78.17	55.47	414.56	417.40		
20090505	417.00	427.00	425.00	85.04	85.77	55.13	416.97	416.90		
20090506	423.00	428.25	426.75	80.11	84.32	56.14	418.67	416.43		
20090507	428.00	438.50	431.00	81.72	82.29	58.59	421.36	416.60		
20090508	435.00	440.00	439.75	88.73	83.52	63.15	425.61	417.17		
20090511	436.50	440.50	440.25	94.42	88.29	63.39	429.61	418.05		
20090512	446.50	450.00	448.00	98.39	93.84	67.09	432.53	419.42		
20090513	442.00	454.00	447.25	94.70	95.83	66.39	435.19	420.49		
20090514	445.25	450.00	449.25	92.16	95.08	67.37	436.97	422.11		
20090515	437.00	451.25	438.50	83.78	90.21	57.67	438.42	423.14		
20090518	433.00	446.00	442.00	79.01	84.98	59.71	440.31	424.81		
20090519	443.00	449.50	447.00	75.64	79.48	62.48	442.56	427.11		
20090520	445.00	456.00	447.25	77.77	77.47	62.62	444.36	429.19		
20090521	439.00	449.00	445.50	77.45	76.95	60.92	445.00	431.20		
20090522	448.50	455.75	452.00	80.13	78.45	64.74	446.31	433.13		
20090526	445.00	455.00	450.25	81.80	79.79	62.96	446.56	435.20		
20090527	448.00	455.75	449.75	83.33	81.75	62.43	446.83	437.50		
20090528	446.75	457.50	452.25	79.61	81.58	64.05	447.17	439.79		
20090529	455.00	460.00	459.25	84.49	82.48	68.21	449.47	441.57		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20090601	463.75	469.00	469.25	92.16	85.42	73.00	452.50	443.76	469.25	
20090602	465.00	473.00	472.75	99.10	91.92	74.46	455.36	445.64	472.75	
20090603	454.00	468.75	455.00	85.02	92.09	57.54	456.22	447.05		
20090604	459.00	471.25	471.50	83.54	89.22	65.41	459.11	449.26		
20090605	464.00	470.00	467.50	79.17	82.58	62.39	460.83	451.20		
20090608	456.50	464.00	458.00	79.46	80.72	55.81	461.69	452.49		
20090609	462.50	468.00	466.25	74.09	77.57	59.78	463.53	453.75		
20090610	457.00	471.50	458.00	63.97	72.51	54.50	464.17	454.60		
20090611	462.00	469.25	463.25	67.07	68.38	57.10	464.61	455.32		
20090612	443.25	458.75	447.75	45.40	58.81	48.34	462.22	455.35		
20090615	427.25	438.00	427.75	27.13	46.53	39.84	457.22	454.32		
20090616	424.25	432.50	425.25	6.09	26.21	38.92	453.92	453.69		
20090617	419.25	429.75	428.75	6.94	13.39	40.98	449.17	453.06		
20090618	422.50	428.00	423.75	9.37	7.47	38.96	444.31	451.95		
20090619	418.50	427.75	419.50	9.29	8.53	37.28	440.03	450.63		
20090622	400.50	408.50	405.50	5.75	8.14	32.33	433.28	448.73		
20090623	401.00	409.75	409.00	6.95	7.33	34.67	427.83	446.68		
20090624	401.50	411.00	407.25	9.51	7.40	34.03	421.61	444.63		
20090625	400.50	408.25	401.50	7.63	8.03	31.97	416.47	442.33		
20090626	399.00	406.25	404.25	6.05	7.73	34.03	413.86	440.05		
20090629	396.00	403.00	397.25	3.44	5.71	31.42	410.75	437.10		
20090630	367.25	375.00	367.25	2.97	4.15	23.21	403.92	432.24		367.25
20090701	362.00	373.50	369.25	3.05	3.15	24.63	397.86	427.31		369.25
20090702	357.00	364.00	357.50	2.70	2.91	22.06	390.97	422.67		357.50
20090706	343.75	349.75	344.25	2.89	2.88	19.58	384.17	416.61		344.25
20090707	335.00	350.25	335.75	0.66	2.08	18.16	376.03	410.33		335.75
20090708	332.00	340.25	334.25	1.23	1.59	17.92	367.92	404.44		334.25
20090709	335.75	341.00	340.00	3.83	1.91	22.26	361.08	398.43		340.00
20090710	328.50	338.50	338.00	7.40	4.16	21.82	353.72	392.71		338.00
20090713	329.50	339.75	339.50	11.07	7.43	23.03	347.31	386.82		339.50
20090714	339.50	346.00	345.50	15.15	11.21	27.83	344.89	381.95		345.50
20090715	336.00	349.25	337.50	15.07	13.76	25.54	341.36	377.65		337.50
20090716	324.75	334.75	325.25	10.83	13.69	22.50	337.78	372.89		325.25
20090717	324.75	332.00	331.50	6.84	10.92	27.26	336.36	368.26		331.50
20090720	328.50	334.00	333.75	9.05	8.91	28.96	336.14	363.98		333.75
20090721	320.50	332.50	322.00	9.79	8.56	25.60	334.78	359.33		322.00
20090722	314.75	320.75	319.25	9.96	9.60	24.88	332.47	355.23		319.25
20090723	326.75	339.50	338.75	26.52	15.42	38.26	332.56	351.88		
20090724	325.50	338.50	327.25	37.32	24.60	34.37	331.19	348.07		
20090727	325.00	334.50	333.75	52.63	38.82	38.19	329.89	344.85		
20090728	329.75	336.00	329.75	44.59	44.85	36.77	329.03	341.30		
20090729	322.75	328.25	328.00	45.65	47.62	36.14	329.33	338.00		
20090730	335.00	344.00	342.25	53.86	48.03	44.51	330.53	336.81		
20090731	339.50	350.00	349.50	72.23	57.25	48.23	332.28	335.87		
20090803	360.50	375.25	369.00	89.32	71.81	56.65	337.50	336.42		
20090804	364.00	372.00	365.75	90.85	84.13	55.04	342.67	337.44		
20090805	349.00	367.50	357.00	81.27	87.15	50.86	344.69	338.45		
20090806	339.00	351.25	340.25	65.43	79.18	43.97	346.14	338.74		
20090807	326.00	340.00	326.50	43.80	63.50	39.27	345.33	338.10		
20090810	327.50	336.25	330.50	29.20	46.14	41.24	345.42	337.74		
20090811	328.50	333.25	331.00	20.39	31.13	41.50	345.75	337.33		
20090812	322.00	339.00	336.25	22.84	24.14	44.24	345.08	336.89		
20090813	331.25	342.50	332.00	20.42	21.21	42.50	343.14	336.63		
20090814	325.75	329.25	327.75	18.78	20.68	40.78	338.56	336.75		
20090817	311.75	322.50	321.75	15.11	18.10	38.41	333.67	336.29		
20090818	318.50	323.00	322.50	14.49	16.13	38.89	329.83	335.75		
20090819	319.50	329.00	327.50	19.16	16.25	42.11	328.42	336.01		
20090820	322.75	328.25	324.00	20.34	18.00	40.50	328.14	336.24		
20090821	322.00	332.00	326.25	22.72	20.74	42.04	327.67	335.64		
20090824	329.50	335.50	335.50	28.65	23.90	47.97	328.17	336.04		
20090825	322.75	337.50	326.75	34.88	28.75	43.44	327.11	335.70		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20090826	323.75	329.25	326.25	42.58	35.37	43.19	326.47	335.54		
20090827	321.00	330.25	329.25	47.35	41.60	45.23	326.64	335.60		
20090828	324.50	332.00	329.00	53.39	47.77	45.09	327.44	334.96		
20090831	320.00	330.50	329.75	57.18	52.64	45.65	328.25	334.02		
20090901	316.75	326.25	319.25	46.34	52.30	39.52	327.33	331.65		
20090902	315.50	319.50	319.25	37.35	46.96	39.52	326.81	329.44		
20090903	311.50	320.00	315.75	23.29	35.66	37.57	325.64	327.48		
20090904	306.00	312.50	306.25	15.42	25.35	32.83	322.39	325.86		
20090908	305.25	310.50	307.50	8.04	15.58	34.01	320.25	324.95		
20090909	306.00	312.00	309.75	7.24	10.23	36.18	318.42	323.96		
20090910	309.50	318.50	315.25	17.31	10.86	41.27	316.86	323.21		
20090911	309.00	320.25	319.75	29.97	18.18	45.13	315.83	322.43		
20090914	315.50	320.00	317.75	38.24	28.51	43.75	314.50	321.75		
20090915	322.50	347.75	346.50	60.26	42.83	61.78	317.53	322.64		
20090916	325.00	342.00	336.25	69.59	56.03	55.01	319.42	323.33		
20090917	323.00	331.50	329.00	75.29	68.38	50.77	320.89	323.64		
20090918	316.75	327.25	318.00	52.94	65.94	45.10	322.19	323.19		
20090921	310.50	316.50	316.00	37.06	55.10	44.13	323.14	322.81		
20090922	316.75	326.00	325.75	34.51	41.50	49.78	324.92	322.79		
20090923	319.25	335.00	330.25	44.12	38.56	52.18	326.58	322.54		
20090924	323.00	337.75	336.50	60.20	46.27	55.38	328.44	323.00		
20090925	328.75	340.50	334.00	66.67	56.99	53.83	330.25	323.37		
20090928	332.25	339.50	338.75	73.21	66.69	56.33	329.39	323.82		
20090929	336.50	346.25	341.00	76.22	72.03	57.50	329.92	324.39		
20090930	335.50	344.25	344.00	83.78	77.74	59.08	331.58	325.07		
20091001	337.50	346.00	340.50	84.48	81.50	56.44	334.08	326.08		
20091002	331.75	340.25	333.50	77.53	81.93	51.50	336.03	326.76		
20091005	330.50	350.00	341.50	73.59	78.53	56.22	337.78	327.99		
20091006	355.50	369.75	358.25	73.61	74.91	64.10	340.89	330.46		
20091007	354.25	364.00	359.75	80.73	75.97	64.71	343.47	332.95		
20091008	362.00	370.00	364.00	84.54	79.63	66.46	346.81	335.54		
20091009	359.00	373.00	362.25	84.64	83.31	65.03	349.42	337.77		
20091012	371.50	383.50	381.25	89.10	86.10	72.05	353.89	340.70	381.25	
20091013	375.00	386.25	381.75	90.09	87.94	72.21	358.08	343.75	381.75	
20091014	377.75	388.50	383.00	93.39	90.86	72.62	362.81	345.49	383.00	
20091015	369.00	378.00	373.00	85.65	89.71	64.31	367.19	347.24		
20091016	368.75	375.00	372.00	78.54	85.86	63.53	370.58	349.29		
20091019	375.50	387.50	386.25	80.32	81.50	69.27	373.69	352.54		
20091020	379.50	387.50	384.50	86.93	81.93	67.86	376.44	355.80		
20091021	387.00	403.50	398.25	94.01	87.08	72.59	380.25	359.25	398.25	
20091022	395.25	405.00	403.50	94.63	91.86	74.15	384.83	362.74	403.50	
20091023	395.00	413.00	397.75	88.28	92.31	69.48	386.67	365.65		
20091026	376.75	400.00	378.00	70.82	84.58	56.34	386.25	367.75		
20091027	369.50	378.50	370.75	45.41	68.17	52.42	384.89	369.27		
20091028	365.25	372.00	369.00	26.90	47.71	51.49	384.44	370.61		
20091029	372.50	381.75	379.50	23.37	31.89	56.48	385.28	372.30		
20091030	364.00	374.00	366.00	17.48	22.59	49.43	383.03	373.51		
20091102	366.75	383.50	382.25	23.72	21.53	56.47	382.78	375.83		
20091103	375.50	396.25	390.00	31.46	24.22	59.38	381.86	378.14		
20091104	383.50	398.75	384.00	43.71	32.96	56.25	379.69	379.37		
20091105	376.25	386.00	376.50	39.80	38.32	52.52	377.33	380.17		
20091106	366.00	372.50	367.00	24.15	35.88	48.17	376.11	380.31		
20091109	369.25	388.00	386.00	25.51	29.82	56.02	377.81	381.44		
20091110	380.50	397.00	394.50	37.76	29.14	59.01	380.64	382.07		
20091111	392.00	402.50	394.00	56.12	39.80	58.76	382.25	382.65		
20091112	385.00	398.00	390.50	64.10	52.66	56.92	384.97	383.01		
20091113	385.75	394.00	390.50	66.30	62.17	56.92	385.89	383.85		
20091116	396.25	403.00	402.25	78.58	69.66	61.60	387.25	385.29		
20091117	397.00	404.00	402.00	87.30	77.39	61.45	389.25	386.04		
20091118	397.75	409.00	398.00	89.54	85.14	58.93	391.64	386.68		
20091119	390.50	400.00	395.00	79.33	85.39	57.03	394.75	386.52		

Date	Low (c/bu)	High (c/bu)	Close (c/bu)	Stochastics		RSI	Moving averages		Sell (c/bu)	Buy (c/bu)
							9-day	21-day		
20091120	389.00	394.75	391.00	67.05	78.64	54.52	395.31	385.93		
20091123	385.25	402.75	387.25	58.33	68.24	52.20	394.50	385.43		
20091124	375.00	383.00	376.00	43.60	56.33	45.89	392.50	385.33		
20091125	381.50	393.50	392.00	44.38	48.77	54.34	392.67	386.35		
20091127	383.00	398.25	397.25	51.39	46.46	56.73	393.42	387.69		
20091130	392.25	405.00	402.75	70.84	55.54	59.15	393.47	388.80		
20091201	397.50	405.50	399.75	74.95	65.73	57.27	393.22	390.40		
20091202	390.00	398.00	391.75	67.89	71.23	52.49	392.53	390.86		
20091203	385.00	391.50	385.25	50.74	64.53	48.92	391.44	390.63		
20091204	373.50	384.75	373.75	26.71	48.44	43.30	389.53	390.14		
20091207	367.50	374.25	368.75	11.29	29.58	41.09	387.47	389.77		
20091208	368.00	371.00	369.50	2.85	13.61	41.57	386.75	389.89		
20091209	364.00	372.50	368.00	5.82	6.65	40.85	384.08	389.04		
20081209	311.00	320.00	312.25	17.38	9.92	33.12	326.56	351.35		
20081210	318.00	328.50	326.75	31.57	19.55	39.71	323.53	348.64		
20081211	325.00	342.00	338.00	45.70	31.55	44.29	322.25	346.92		
20081212	328.00	364.00	359.50	69.2	48.82	51.83	325.22	346.44		
20001214	209.25	211.00	210.50	50	41.77	54.91	208.17	208.87		

APPENDIX II

RESEARCH QUESTIONNAIRE

SECTION A

Demographic information

1. What position do you hold within your business? (Please tick applicable box)

Owner	
Managing director	
Procurement manager	
Financial manager	
Sales manager	
Trader	

2. How many years of grain trading experience do you have?
   (Please tick applicable box)

1 – 3 years	
3 – 6 years	
6 – 9 years	
9 + years	

3. Contact details

   Name of organisation: _____

   Contact details: _____

SECTION B

General

1. Indicate the relevant agricultural sector within which your business operates.
   (Please tick the applicable box)

Producer	
Processor (including feedlots)	
Speculator	
Market advisory service	

2. Rate your level of financial exposure to changes in the price of corn (maize) futures contracts. (Please tick applicable box)

1	2	3	4	5
Exceptionally low	Low	Average	High	Exceptionally high

3. Does the price of corn (maize) have a direct or indirect impact on the profitability of your business?
   (Please tick applicable box)

1	2
Direct impact	Indirect impact

Price volatility and forecastability

4. Rate the general trend in corn (maize) price volatility as experienced by your business. (Please tick applicable box)

1	2	3
Decreasing	Stable	Increasing

5. Do increased volatility levels complicate your trading decisions? (Please tick applicable box)

Yes	No

6. Do you attempt to anticipate future price movements (i.e. forecast prices) in addressing corn (maize) price volatility? (Please tick applicable box)

Yes	No

If you answered “yes” at the previous question, please continue at question 7.
If you answered “no” at the previous question, please continue at question 11.

7. What type of analysis do you favour in forecasting future price movements? (Please tick applicable box)

1	2	3
Technical analysis	Fundamental analysis	Trend analysis

8. Rate the level of price forecasting success achieved by your business. (Please tick applicable box)

1	2	3	4	5
Exceptionally low	Low	Average	High	Exceptionally high

9. Estimate your success ratio in forecasting future price movements. (Please tick applicable box)

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

10. Are you able to <u>consistently</u> make accurate price forecasts? (Please tick applicable box)

Yes	No

<u>Trading strategy</u>

11. Do you implement the same price risk management strategy on an annual basis? (Please tick applicable box)

Yes	No

12. Do you alter the price risk management strategy to allow for either a bullish, bearish or neutral market? (Please tick applicable box)

Yes	No

<u>Speculators need not answer questions 13; 14; 16</u>

13. What percentage of the total volume of expected corn (maize) do you hedge upfront (i.e. not in the spot market)?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

14. What is the importance of a force majeure characteristic incorporated into the trading strategy? (Please tick applicable box)

1	2	3	4
Not important at all	Average	Important	Very important

15. Do you make use of options contracts in your strategy? (Please tick applicable box)

Yes	No

16. What percentage of the total volume of expected corn (maize) do you hedge by way of options contracts (i.e. not in the spot market)? (Please tick applicable box)

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

17. Is your current trading strategy able to adjust to market movement (i.e. keep up with price movement)? (Please tick applicable box)

Yes	No

18. Is your current trading strategy able to minimise and exploit market volatility? (Please tick applicable box)

Yes	No

<u>Benchmark and proposed methodology</u>

19. What do you view as a satisfactory return/price level achieved from the application of your trading strategy? (Please tick applicable box)

Average price over contract life-time	1
Superior to average price over contract life-time	2
Middle of highest and lowest trade over contract-lifetime	3
Better than spot price on contract maturity	4

20. Have you taken notice of a methodology which has proven to yield consistent superior returns; possesses a force majeure characteristic and can be implemented

annually notwithstanding the existence of a bullish, bearish or neutral market? (Please tick applicable box)

Yes	No

21. Should a methodology as described above exist, would you consider implementing it for your business? (Please tick applicable box)

Yes	No

22. Should a methodology as described above exist, would it significantly increase business profitability? (Please tick applicable box)

Yes	No

23. What price would you be willing to pay in order to annually implement a methodology as described above? (Please tick applicable box)

0% - 2.5% of realised price	1
2.5% - 5% of realised price	2
5% -7.5% of realised price	3
7.5% -10% of realised price	4

Feasibility of methodology

24. Do you/your broker have access to live corn (maize) futures prices? (Please tick applicable box)

Yes	No

25. Do you/your broker have access to live technical analysis data? (Please tick applicable box)

Yes	No

26. Are you able to trade corn/maize futures and options contracts on any given trading day? (Please tick applicable box)

Yes	No

APPENDIX III

DIAGNOSTIC QUESTIONNAIRE

1. Are the questions presented in a logical sequence? | Yes | No |

2. Was the objective of each question easily recognisable? | Yes | No |
   (If not, please indicate the questions which should be reviewed)

   _____

3. Did you find any questions to be ambiguous? | Yes | No |
   (If so, please indicate the relevant questions)

   _____

4. Did all of the questions relate to your business environment? | Yes | No |
   (If not, please indicate the questions you found non-applicable)

   _____

5. Are there any questions you would like to add to the questionnaire?
   (If so, please indicate) | Yes | No |

   _____

6. Did the level of sensitivity of any question prevent you from completing the questionnaire? | Yes | No |

   _____

7. How long did you take to complete the questionnaire?

   _____

8. Comments, suggestions

   _____

APPENDIX IV

APPLICATION OF METHODOLOGY ON CORN FUTURES PRICES 2000 - 2009

2000

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-00	2000/01/12	$2.45	Buy	Put	22.40%	$2.40	-$0.17	$2.23
Dec-00	2000/01/12	$2.45	Buy	Put	22.40%	$2.00	-$0.04	$2.19
Dec-00	2000/01/12	$2.45	Sell	Call	22.40%	$3.00	$0.05	$2.24
Dec-00	2000/06/12	$2.29	Buy	Call	28.80%	$3.00	-$0.02	$2.22
Dec-00	2000/06/12	$2.29	Sell	Put	28.80%	$2.00	$0.06	$2.28
Dec-00	2000/06/12	$2.29	Sell	Put	28.80%	$1.80	$0.02	$2.30
Dec-00	2000/10/12	$2.08	Buy	Put	17.40%	$1.80	$0.00	**$2.30**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-00	2000/04/28	$2.50	Buy	Call	16.80%	$2.60	$0.08	$2.68
Dec-00	2000/04/28	$2.50	Buy	Call	16.80%	$3.00	$0.01	$2.69
		$2.00 put option bought due to insufficient premium						
Dec-00	2000/04/28	$2.50	Buy	Put	16.80%	$2.00	$0.00	$2.69
Dec-00	2000/06/12	$2.29	Sell	Put	28.80%	$2.00	-$0.06	$2.63
Dec-00	2000/06/26	$2.15	Sell	Call	28.80%	$2.60	-$0.03	
Dec-00	2000/06/26	$2.15	Buy	Call	28.80%	$2.20	$0.13	$2.33
Dec-00	2000/07/17	$1.91	Sell	Call	20.40%	$2.20	-$0.01	
Dec-00	2000/07/17	$1.91	Buy	Call	20.40%	$2.00	$0.06	**$2.18**

2001

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-01	2001/04/30	$2.27	Buy	Put	20.80%	$2.20	-$0.11	$2.09
Dec-01	2001/04/30	$2.27	Buy	Put	20.80%	$1.80	-$0.01	$2.08
		$2.80 call option bought due to insufficient premium						
Dec-01	2001/04/30	$2.27	Buy	Call	20.80%	$2.80	$0.00	$2.08
Dec-01	2001/05/21	$2.13	Sell	Put	21.30%	$1.80	$0.02	$2.10
Dec-01	2001/05/21	$2.13	Sell	Put	21.30%	$1.80	$0.02	$2.12
Dec-01	2001/07/10	$2.29	Sell	Call	41.60%	$2.80	$0.07	$2.19
Dec-01	2001/07/12	$2.46	Sell	Put	41.60%	$2.20	$0.12	
Dec-01	2001/07/12	$2.46	Buy	Put	41.60%	$2.40	-$0.21	
Dec-01	Expire	$2.07		Put		$1.80		**$2.30**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-01	2001/03/16	$2.34	Buy	Call	19.20%	$2.40	$0.11	$2.51
Dec-01	2001/03/16	$2.34	Buy	Call	19.20%	$2.80	$0.01	$2.52
		$1.80 put option bought due to insufficient premium						
Dec-01	2001/03/16	$2.34	Buy	Put	19.20%	$1.80	$0.00	$2.52
Dec-01	2001/05/21	$2.13	Sell	Call	21.30%	$2.40	-$0.04	
Dec-01	2001/05/21	$2.13	Buy	Call	21.30%	$2.20	$0.09	$2.37
Dec-01	2001/05/21	$2.13	Sell	Put	21.30%	$1.80	-$0.02	$2.35
Dec-01	2001/07/10	$2.29	Sell	Call	41.60%	$2.80	-$0.07	$2.28
Dec-01	2001/07/10	$2.29	Sell	Call	41.60%	$2.80	-$0.07	$2.21
Dec-01	2001/10/02	$2.09	Buy	Call	15.00%	$2.80	$0.00	$2.21
Dec-01	Expire	$2.07						**$2.08**

2002

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-02	2002/04/30	$2.17	Buy	Put	12.50%	$2.20	-$0.10	$2.10
Dec-02	2002/04/30	$2.17	Buy	Put	12.50%	$1.80	$0.00	$2.10
		$2.60 call option bought due to insufficient premium						
Dec-02	2002/04/30	$2.17	Buy	Call	12.50%	$2.60	$0.00	$2.10
Dec-02	2002/05/13	$2.31	Sell	Call	23.20%	$2.60	$0.06	$2.16
Dec-02	2002/06/27	$2.45	Sell	Put	19.70%	$2.20	$0.03	
Dec-02	2002/06/27	$2.45	Buy	Put	19.70%	$2.40	-$0.10	$2.29
Dec-02	2002/08/13	$2.80	Sell	Put	25.40%	$2.40	$0.02	
Dec-02	2002/08/13	$2.80	Buy	Put	25.40%	$2.80	-$0.15	**$2.56**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-02	2002/01/02	$2.34	Buy	Call	12.00%	$2.40	$0.08	$2.48
Dec-02	2002/01/02	$2.34	Buy	Call	12.00%	$2.80	$0.01	$2.49
		$1.80 put option bought due to insufficient premium						
Dec-02	2002/01/02	$2.34	Buy	Put	12.00%	$1.80	$0.00	$2.49
Dec-02	2002/04/19	$2.17	Sell	Call	11.40%	$2.40	-$0.01	
Dec-02	2002/04/19	$2.17	Buy	Call	11.40%	$2.20	$0.06	$2.34
Dec-02	2002/05/13	$2.31	Sell	Call	23.20%	$2.80	-$0.03	$2.31
Dec-02	2002/05/13	$2.31	Sell	Call	23.20%	$2.80	-$0.03	$2.28
Dec-02	2002/11/08	$2.36	Buy	Call	16.70%	$2.80	$0.00	**$2.28**

2003

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-03	2003/04/30	$2.33	Buy	Put	12.50%	$2.40	-$0.13	$2.27
Dec-03	2003/04/30	$2.33	Buy	Put	12.50%	$1.80	$0.00	$2.27
		$2.80 call option bought due to insufficient premium						
Dec-03	2003/04/30	$2.33	Buy	Call	12.50%	$2.80	$0.00	$2.27
Dec-03	2003/05/15	$2.52	Sell	Call	22.60%	$2.80	$0.07	$2.34
Dec-03	2003/06/30	$2.24	Sell	Put	19.70%	$1.80	$0.00	**$2.34**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-03	2003/04/30	$2.33	Buy	Call	12.50%	$2.40	$0.06	$2.46
Dec-03	2003/04/30	$2.33	Buy	Call	12.50%	$2.80	$0.00	$2.46
		$1.80 put option bought due to insufficient premium						
Dec-03	2003/04/30	$2.33	Buy	Put	12.50%	$1.80	$0.00	$2.46
Dec-03	2003/05/15	$2.52	Sell	Call	22.60%	$2.80	-$0.07	$2.39
Dec-03	2003/05/15	$2.52	Sell	Call	22.60%	$3.00	-$0.03	$2.36
Dec-03	2003/06/30	$2.24	Buy	Call	19.70%	$3.00	$0.00	$2.36
Dec-03	2003/07/11	$2.15	Sell	Call	16.60%	$2.40	-$0.02	
Dec-03	2003/07/11	$2.15	Buy	Call	16.60%	$2.20	$0.07	**$2.21**

2004

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-04	2004/01/12	$2.60	Buy	Put	26.00%	$2.60	-$0.26	$2.34
Dec-04	2004/01/12	$2.60	Buy	Put	26.00%	$2.00	-$0.04	$2.30
Dec-04	2004/01/12	$2.60	Sell	Call	26.00%	$3.20	$0.07	$2.37
Dec-04	2004/02/24	$2.92	Sell	Put	17.90%	$2.60	$0.05	
Dec-04	2004/02/24	$2.92	Buy	Put	17.90%	$3.00	-$0.22	$2.60
Dec-04	2004/04/02	$3.34	Sell	Put	26.30%	$3.00	$0.13	
Dec-04	2004/04/02	$3.34	Buy	Put	26.30%	$3.40	-$0.31	$2.82
Dec-04	2004/07/06	$2.59	Sell	Put	20.40%	$2.00	$0.00	$2.82
Dec-04	2004/07/06	$2.59	Sell	Put	20.40%	$2.00	$0.00	$2.82
Dec-04	2004/09/20	$2.13	Buy	Call	15.10%	$2.60	$0.00	$2.82
Delta:								
	Short Call	$3.20						
Dec-04	2004/04/01	$3.27	Buy	Future		$3.27		
Dec-04	2004/04/13	$3.14	Sell	Future		$3.14	-$0.13	**$2.70**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-04	2004/04/30	$3.17	Buy	Call	26.30%	$3.20	$0.24	$3.44
Dec-04	2004/04/30	$3.17	Buy	Call	26.30%	$3.80	$0.07	$3.51
Dec-04	2004/04/30	$3.17	Sell	Put	26.30%	$2.60	-$0.05	$3.46
Dec-04	2004/07/06	$2.59	Sell	Call	20.40%	$3.20	-$0.01	$3.45
Dec-04	2004/07/06	$2.59	Buy	Call	20.40%	$2.60	$0.12	$2.73
Dec-04	2004/07/22	$2.28	Sell	Call	20.40%	$2.60	-$0.02	$2.71
Dec-04	2004/07/22	$2.28	Buy	Call	20.40%	$2.20	$0.15	$2.46
Delta:								
	Short Put	$2.60						
Dec-04	2004/04/30	$2.59	Sell	Future		$2.59		$0.01
Dec-01	Expire	$1.99						**$2.50**

2005

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-05	2005/02/28	$2.42	Buy	Put	20.90%	$2.40	-$0.16	$2.24
Dec-05	2005/02/28	$2.42	Buy	Put	20.90%	$2.00	-$0.02	$2.22
Dec-05	2005/02/28	$2.42	Sell	Call	20.90%	$3.00	$0.03	$2.25
Dec-05	2005/09/15	$2.07	Sell	Put	16.00%	$2.00	$0.03	$2.28
Dec-05	2005/09/15	$2.07	Sell	Put	16.00%	$1.60	$0.00	$2.28
Dec-05	2005/09/15	$2.07	Buy	Call	16.00%	$3.00	$0.00	**$2.28**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-05	2005/01/18	$2.27	Buy	Call	20.10%	$2.20	$0.20	$2.40
Dec-05	2005/01/18	$2.27	Buy	Call	20.10%	$2.60	$0.06	$2.46
Dec-05	2005/01/18	$2.27	Sell	Put	20.10%	$1.80	-$0.02	$2.44
Dec-05	2005/02/28	$2.42	Buy	Put	20.90%	$1.80	$0.01	$2.45
Dec-05	2005/06/20	$2.56	Sell	Call	33.80%	$2.60	-$0.20	$2.25
Dec-05	2005/06/20	$2.56	Sell	Call	33.80%	$3.20	-$0.05	$2.20
Dec-05	2005/09/15	$2.07	Buy	Call	16.00%	$3.20	$0.00	$2.20
Dec-05	2005/10/28	$1.97	Sell	Call	10.45%	$2.20	$0.00	
Dec-05	2005/10/28	$1.97	Buy	Call	10.45%	$2.00	$0.01	$2.01
								$1.92

2006

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-06	2006/02/03	$2.60	Buy	Put	23.10%	$2.60	-$0.21	$2.39
Dec-06	2006/02/03	$2.60	Buy	Put	23.10%	$2.00	-$0.02	$2.37
Dec-06	2006/02/03	$2.60	Sell	Call	23.10%	$3.20	$0.05	$2.42
Dec-06	2006/05/17	$2.87	Sell	Put	31.30%	$2.60	$0.13	
Dec-06	2006/05/17	$2.87	Buy	Put	31.30%	$2.80	-$0.22	$2.53
Dec-06	2006/08/17	$2.36	Sell	Put	30.20%	$2.00	$0.02	$2.55
Dec-06	2006/08/17	$2.36	Sell	Put	30.20%	$1.80	$0.01	$2.56
Dec-06	2006/08/17	$2.36	Buy	Call	30.20%	$3.20	$0.00	$2.56
Dec-06	2006/10/09	$2.90	Buy	Put	43.50%	$1.80	$0.00	$2.56
Dec-06	2006/10/13	$3.15	Sell	Put	43.50%	$2.80	$0.04	
Dec-06	2006/10/13	$3.15	Buy	Put	43.50%	$3.20	-$0.20	$2.80
Dec-06	2006/11/08	$3.58	Sell	Put	26.90%	$3.20	$0.00	
Dec-06	2006/11/08	$3.58	Buy	Put	26.90%	$3.60	-$0.07	**$3.13**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-06	2006/04/28	$2.72	Buy	Call	19.80%	$2.80	$0.12	$2.92
Dec-06	2006/04/28	$2.72	Buy	Call	19.80%	$3.40	$0.01	$2.93
		$2.20 put option bought due to insufficient premium						
Dec-06	2006/04/28	$2.72	Buy	Put	19.80%	2.2	0.01	$2.94
Dec-06	2006/05/17	$2.87	Sell	Call	31.30%	$3.40	-$0.09	$2.84
Dec-06	2006/05/17	$2.87	Sell	Call	31.30%	$3.40	-$0.09	$2.75
Dec-06	2006/08/17	$2.36	Buy	Call	30.20%	$3.40	$0.00	$2.75
Dec-06	2006/08/17	$2.36	Sell	Call	30.20%	$2.80	-$0.02	
Dec-06	2006/08/17	$2.36	Buy	Call	30.20%	$2.40	$0.12	$2.34
Dec-06	2006/08/17	$2.36	Sell	Put	30.20%	$2.20	-$0.07	**$2.27**

2007

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-07	2007/01/23	$4.03	Buy	Put	38.10%	$4.00	-$0.53	$3.47
Dec-07	2007/01/23	$4.03	Buy	Put	38.10%	$3.20	-$0.18	$3.29
Dec-07	2007/01/23	$4.03	Sell	Call	38.10%	$4.80	$0.30	$3.59
Dec-07	2007/07/03	$3.38	Sell	Put	30.10%	$3.20	$0.16	$3.75
Dec-07	2007/07/03	$3.38	Sell	Put	30.10%	$2.80	$0.04	$3.79
Dec-07	2007/07/03	$3.38	Buy	Call	30.10%	$4.80	-$0.01	**$3.78**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-07	2007/04/03	$3.68	Buy	Call	36.80%	$3.60	$0.46	$4.06
Dec-07	2007/04/03	$3.68	Buy	Call	36.80%	$4.40	$0.19	$4.25
Dec-07	2007/04/03	$3.68	Sell	Put	36.80%	$3.00	-$0.14	$4.11
Dec-07	2007/06/14	$4.18	Sell	Call	38.10%	$4.40	-$0.32	$3.79
Dec-07	2007/06/14	$4.18	Sell	Call	38.10%	$5.00	-$0.15	$3.64
Dec-07	2007/07/03	$3.38	Buy	Call	30.10%	$5.00	$0.00	**$3.64**

2008

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-08	2008/01/02	$4.80	Buy	Put	32.20%	$4.80	-$0.58	$4.22
Dec-08	2008/01/02	$4.80	Buy	Put	32.20%	$3.80	-$0.16	$4.06
Dec-08	2008/01/02	$4.80	Sell	Call	32.20%	$5.80	$0.26	$4.32
Dec-08	2008/01/14	$5.31	Sell	Put	32.20%	$4.80	$0.38	
Dec-08	2008/01/14	$5.31	Buy	Put	32.20%	$5.40	-$0.68	$4.62
Dec-08	2008/06/10	$7.03	Sell	Put	35.10%	$5.40	$0.10	
Dec-08	2008/06/10	$7.03	Buy	Put	35.10%	$7.00	-$0.64	$5.68
Dec-08	2008/06/17	$7.76	Sell	Put	35.10%	$7.00	$0.36	
Dec-08	2008/06/17	$7.76	Buy	Put	35.10%	$7.80	-$0.73	$6.11
Dec-08	2008/11/21	$3.39	Sell	Future		$3.80	$0.42	$6.53
Delta:								
	Short Call	$5.80						
Dec-08	2008/03/11	$5.86	Buy	Future		$5.86		
Dec-08	2008/03/12	$5.79	Sell	Future		$5.79	-$0.07	
Dec-08	2008/03/13	$5.83	Buy	Future		$5.83		
Dec-08	2008/03/14	$5.75	Sell	Future		$5.75	-$0.08	
Dec-08	2008/03/31	$5.81	Buy	Future		$5.81		
Dec-08	2008/08/04	$5.56	Sell	Future		$5.56	-$0.26	
Dec-08	2008/08/19	$5.85	Buy	Future		$5.85		
Dec-08	2008/09/02	$5.69	Sell	Future		$5.69	-$0.15	**$5.97**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-08	2008/04/30	$6.28	Buy	Call	28.90%	$6.20	$0.58	$6.78
Dec-08	2008/04/30	$6.28	Buy	Call	28.90%	$7.40	$0.19	$6.97
Dec-08	2008/04/30	$6.28	Sell	Put	28.90%	$5.00	-$0.09	$6.88
Dec-08	2008/06/10	$7.03	Sell	Call	35.10%	$7.40	-$0.51	$6.37
Dec-08	2008/06/10	$7.03	Sell	Call	35.10%	$8.40	-$0.23	$6.14
Dec-08	2008/06/27	$7.87	Buy	Put	35.10%	$5.00	$0.01	$6.15
Dec-08	2008/07/21	$6.08	Buy	Call	36.50%	$8.40	$0.04	$6.19
Dec-08	2008/08/04	$5.56	Sell	Call	51.20%	$6.20	-$0.38	
Dec-08	2008/08/04	$5.56	Buy	Call	51.20%	$5.60	$0.60	$5.81
Dec-08	2008/10/02	$4.54	Sell	Call	63.90%	$5.60	-$0.12	
Dec-08	2008/10/02	$4.54	Buy	Call	63.90%	$4.60	$0.40	$5.09
Dec-08	2008/10/10	$4.08	Sell	Call	63.90%	$4.60	-$0.17	
Dec-08	2008/10/10	$4.08	Buy	Call	63.90%	$4.00	$0.39	$4.39
Dec-08	Expire	$3.39						**$4.09**

2009

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-09	2009/01/06	$4.71	Buy	Put	50.90%	$4.80	-$0.93	$3.87
Dec-09	2009/01/06	$4.71	Buy	Put	50.90%	$3.80	-$0.42	$3.45
Dec-09	2009/01/06	$4.71	Sell	Call	50.90%	$5.60	$0.59	$4.04
Dec-09	2009/06/30	$3.67	Sell	Put	41.40%	$3.80	$0.45	$4.49
Dec-09	2009/06/30	$3.67	Sell	Put	41.40%	$3.00	$0.11	$4.60
Dec-09	2009/07/16	$3.25	Buy	Call	46.30%	$5.60	-$0.01	$4.59
Dec-09	2009/10/12	$3.81	Buy	Put	43.00%	$3.00	-$0.01	**$4.58**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
Dec-09	2009/04/30	$4.33	Buy	Call	16.60%	$4.40	$0.18	$4.58
Dec-09	2009/04/30	$4.33	Buy	Call	16.60%	$5.20	$0.02	$4.60
Dec-09	2009/04/30	$4.33	Buy	Put	16.60%	$3.40	$0.00	$4.60
Dec-09	2009/06/01	$4.69	Sell	Call	41.40%	$5.20	-$0.34	$4.26
Dec-09	2009/06/01	$4.69	Sell	Call	41.40%	$5.60	-$0.24	$4.02
Dec-09	2009/06/30	$3.67	Buy	Call	41.40%	$5.60	$0.03	$4.05
Dec-09	2009/06/30	$3.67	Sell	Call	41.40%	$4.40	-$0.15	
Dec-09	2009/06/30	$3.67	Buy	Call	41.40%	$3.60	$0.41	$3.51
Dec-09	2009/06/30	$3.67	Sell	Put	41.40%	$3.40	-$0.24	$3.27
Dec-09	2009/07/21	$3.22	Sell	Call	46.30%	$3.60	-$0.20	
Dec-09	2009/07/21	$3.22	Buy	Call	46.30%	$3.20	$0.35	**$3.02**

APPENDIX V

DAILY CORN FUTURES CLOSING PRICES AND TECHNICAL OSCILLATORS

SAMPLE 1 - 10

SAMPLE 1

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.94	3.31	3.14							
04-Dec	2.99	3.03	3.02							
05-Dec	2.88	3.05	2.95							
08-Dec	2.91	3.17	3.10							
09-Dec	2.89	3.12	2.93							
10-Dec	2.93	3.10	2.98							
11-Dec	2.92	3.20	3.05							
12-Dec	2.67	2.86	2.85							
15-Dec	2.75	2.98	2.85				2.99			
16-Dec	2.73	2.87	2.78				2.95			
17-Dec	2.70	2.90	2.79				2.92			
18-Dec	2.63	2.70	2.64				2.89			
19-Dec	2.60	2.80	2.68				2.84			
22-Dec	2.54	2.84	2.68				2.81			
23-Dec	2.50	2.70	2.54				2.76			
24-Dec	2.29	2.66	2.47	14.56		26.89	2.70			
26-Dec	2.38	2.56	2.39	12.16		25.08	2.65			
29-Dec	2.46	2.74	2.55	19.78	15.50	34.59	2.61			
30-Dec	2.36	2.73	2.53	21.98	17.97	34.01	2.59			
31-Dec	2.48	2.74	2.67	32.23	24.66	41.42	2.57			
02-Jan	2.74	2.84	2.79	46.87	33.69	46.93	2.59	2.78		
05-Jan	2.49	2.71	2.69	57.40	45.50	43.28	2.59	2.76		
06-Jan	2.53	2.76	2.65	63.15	55.80	41.88	2.59	2.74		
07-Jan	2.45	2.64	2.58	54.84	58.46	39.46	2.59	2.72		
08-Jan	2.35	2.52	2.38	40.97	52.99	33.52	2.58	2.69		
09-Jan	2.25	2.41	2.30	24.13	39.98	31.48	2.57	2.66		
12-Jan	2.30	2.69	2.49	21.84	28.98	40.72	2.56	2.64		
13-Jan	2.39	2.62	2.58	35.03	27.00	44.53	2.57	2.61		
14-Jan	2.24	2.48	2.39	40.54	32.47	38.85	2.54	2.59		
15-Jan	2.08	2.35	2.20	32.24	35.94	34.16	2.47	2.56		
16-Jan	2.17	2.55	2.36	25.88	32.88	40.66	2.44	2.54		
20-Jan	2.02	2.25	2.20	24.86	27.66	36.75	2.39	2.51		
21-Jan	2.20	2.44	2.27	29.76	26.83	39.49	2.35	2.49		
22-Jan	2.31	2.45	2.38	32.11	28.91	43.62	2.35	2.48		
23-Jan	2.19	2.54	2.39	41.46	34.45	44.00	2.36	2.47		
26-Jan	2.42	2.50	2.43	49.77	41.12	45.56	2.36	2.46		
27-Jan	2.25	2.31	2.31	49.56	46.93	41.80	2.33	2.45		
28-Jan	2.04	2.16	2.13	38.37	45.90	36.88	2.30	2.44		
29-Jan	2.20	2.45	2.33	35.32	41.09	44.67	2.31	2.43		
30-Jan	2.44	2.51	2.50	44.78	39.49	50.28	2.33	2.43		
02-Feb	2.63	2.64	2.63	72.10	50.73	54.11	2.37	2.43		
03-Feb	2.52	2.63	2.63	89.47	68.78	54.11	2.41	2.42		
04-Feb	2.69	2.87	2.73	93.43	85.00	57.07	2.45	2.42		
05-Feb	2.76	3.05	2.90	89.12	90.67	61.59	2.51	2.43		
06-Feb	2.94	3.05	2.95	86.42	89.66	62.83	2.57	2.45		
09-Feb	2.80	3.03	2.95	88.61	88.05	62.83	2.64	2.48		
10-Feb	2.80	2.94	2.88	87.85	87.63	59.70	2.72	2.51		
11-Feb	2.84	3.01	2.97	88.45	88.30	62.30	2.79	2.53		
12-Feb	2.90	3.10	2.96	87.35	87.88	61.82	2.84	2.55		
13-Feb	2.96	3.18	3.16	92.37	89.39	67.23	2.90	2.58		
17-Feb	3.04	3.38	3.23	91.28	90.33	68.90	2.97	2.63		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
18-Feb	2.93	3.23	3.09	87.49	90.38	62.11	3.01	2.67		
19-Feb	3.02	3.20	3.02	75.31	84.69	58.99	3.02	2.71		
20-Feb	3.09	3.16	3.11	68.58	77.13	61.66	3.04	2.75		
23-Feb	3.11	3.29	3.17	68.63	70.84	63.37	3.07	2.78		
24-Feb	2.96	3.29	3.12	68.83	68.68	60.93	3.09	2.82		
25-Feb	2.82	2.98	2.92	54.57	64.01	52.25	3.09	2.84		
26-Feb	2.94	3.02	2.94	37.42	53.61	52.97	3.08	2.87		
27-Feb	2.86	3.08	2.98	26.99	39.66	54.45	3.06	2.91		
02-Mar	2.84	3.17	3.04	32.18	32.20	56.66	3.04	2.95		
03-Mar	2.99	3.17	3.15	43.78	34.32	60.44	3.05	2.98		
04-Mar	3.01	3.33	3.18	54.86	43.61	61.43	3.07	3.00		
05-Mar	3.07	3.22	3.08	56.55	51.73	56.37	3.06	3.03		
06-Mar	3.09	3.26	3.20	59.52	56.98	60.57	3.07	3.05		
09-Mar	2.88	3.12	3.07	54.44	56.84	54.46	3.06	3.06		
10-Mar	3.17	3.40	3.23	62.52	58.83	59.83	3.10	3.07		
11-Mar	3.26	3.35	3.29	66.91	61.29	61.66	3.14	3.09		
12-Mar	3.12	3.31	3.28	77.01	68.82	61.16	3.17	3.10		
13-Mar	3.38	3.58	3.47	81.96	75.29	66.68	3.22	3.13		
16-Mar	3.44	3.52	3.46	83.02	80.66	66.14	3.25	3.15		
17-Mar	3.31	3.54	3.40	81.80	82.26	62.90	3.28	3.16		
18-Mar	3.22	3.38	3.25	71.76	78.86	55.55	3.29	3.16		
19-Mar	3.30	3.62	3.44	69.33	74.30	61.66	3.32	3.18		
20-Mar	3.23	3.48	3.34	64.83	68.64	57.21	3.35	3.20		
23-Mar	3.40	3.54	3.47	72.94	69.03	61.14	3.38	3.21		
24-Mar	3.13	3.33	3.30	66.22	67.99	54.13	3.38	3.22		
25-Mar	3.08	3.39	3.20	59.91	66.35	50.47	3.37	3.22		
26-Mar	3.08	3.19	3.16	45.95	57.36	49.04	3.34	3.23		
27-Mar	2.86	3.10	3.05	35.36	47.07	45.25	3.29	3.24		
30-Mar	3.08	3.33	3.15	33.67	38.32	49.10	3.26	3.25		
31-Mar	2.76	3.08	2.96	28.80	32.61	42.92	3.23	3.24		
01-Apr	2.84	2.87	2.86	24.35	28.94	40.06	3.17	3.23		
02-Apr	2.64	3.03	2.83	18.09	23.75	39.22	3.11	3.21		
03-Apr	2.81	3.02	2.99	22.24	21.56	45.78	3.06	3.21		
06-Apr	2.76	2.97	2.86	25.85	22.06	41.83	3.01	3.19		
07-Apr	2.89	3.16	2.98	30.95	26.35	46.42	2.98	3.19		
08-Apr	3.03	3.18	3.18	39.05	31.95	53.08	2.98	3.19		
09-Apr	2.92	3.11	3.10	48.60	39.53	50.38	2.99	3.18		
13-Apr	2.90	3.14	3.06	55.70	47.78	49.04	2.98	3.17		
14-Apr	2.87	3.04	3.00	51.70	52.00	47.02	2.98	3.14		
15-Apr	2.98	2.98	2.98	51.09	52.83	46.33	3.00	3.12		
16-Apr	2.72	2.95	2.79	39.67	47.49	40.32	2.99	3.09		
17-Apr	2.52	2.79	2.65	29.02	39.93	36.55	2.96	3.06		
20-Apr	2.60	2.81	2.78	25.73	31.47	41.97	2.95	3.03		
21-Apr	2.68	2.86	2.77	31.11	28.62	41.68	2.92	3.01		
22-Apr	2.63	2.95	2.77	38.38	31.74	41.68	2.88	2.97		
23-Apr	2.52	2.87	2.68	33.33	34.27	38.83	2.83	2.94		
24-Apr	2.50	2.73	2.55	23.16	31.63	35.10	2.77	2.91		
27-Apr	2.63	2.70	2.63	16.90	24.47	38.98	2.73	2.89		
28-Apr	2.47	2.68	2.64	16.80	18.96	39.47	2.70	2.87		
29-Apr	2.44	2.67	2.48	16.26	16.66	34.69	2.66	2.84		
30-Apr	2.18	2.49	2.29	13.71	15.59	30.04	2.62	2.80		
01-May	2.14	2.36	2.20	7.95	12.64	28.12	2.56	2.77		2.20
04-May	2.08	2.32	2.23	11.60	11.08	29.73	2.50	2.74		2.23
05-May	2.23	2.38	2.34	17.74	12.43	35.46	2.45	2.71		
06-May	2.49	2.52	2.49	31.23	20.19	42.36	2.43	2.69		
07-May	2.48	2.73	2.54	43.30	30.75	44.48	2.43	2.67		
08-May	2.50	2.54	2.51	49.81	41.44	43.45	2.41	2.64		
11-May	2.42	2.59	2.49	49.81	47.64	42.73	2.40	2.61		
12-May	2.12	2.45	2.31	41.89	47.17	36.85	2.38	2.58		
13-May	2.08	2.17	2.14	28.49	40.06	32.33	2.36	2.54		
14-May	1.98	2.20	2.15	20.34	30.24	32.85	2.36	2.50		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
15-May	2.19	2.40	2.33	26.19	25.01	41.59	2.37	2.47		
18-May	2.26	2.44	2.33	38.67	28.40	41.59	2.37	2.46		
19-May	2.23	2.60	2.43	51.11	38.66	46.11	2.36	2.44		
20-May	2.13	2.41	2.31	50.22	46.67	41.92	2.33	2.42		
21-May	2.26	2.36	2.30	48.89	50.07	41.58	2.31	2.40		
22-May	2.14	2.26	2.23	40.00	46.37	39.19	2.28	2.38		
26-May	2.21	2.49	2.41	44.44	44.44	47.54	2.29	2.37		
27-May	2.47	2.55	2.49	52.89	45.78	50.77	2.33	2.36		
28-May	2.46	2.56	2.47	68.12	55.15	49.94	2.37	2.36		
29-May	2.25	2.46	2.42	72.67	64.56	47.84	2.38	2.35		
01-Jun	2.44	2.64	2.56	79.29	73.36	53.72	2.40	2.37		
02-Jun	2.36	2.49	2.40	74.16	75.37	47.18	2.40	2.38		
03-Jun	2.40	2.73	2.55	75.84	76.43	52.96	2.43	2.39		
04-Jun	2.55	2.79	2.59	69.78	73.26	54.40	2.46	2.40		
05-Jun	2.36	2.58	2.41	62.71	69.44	47.39	2.48	2.40		
08-Jun	2.43	2.78	2.61	61.62	64.70	54.41	2.50	2.40		
09-Jun	2.41	2.53	2.45	54.55	59.62	48.80	2.50	2.40		
10-Jun	2.27	2.48	2.42	54.76	56.97	47.81	2.49	2.40		
11-Jun	2.19	2.31	2.28	37.70	49.00	43.36	2.47	2.39		
12-Jun	2.15	2.27	2.25	26.75	39.74	42.45	2.44	2.40		
15-Jun	1.96	2.30	2.10	18.01	27.49	38.14	2.41	2.40		
16-Jun	2.13	2.24	2.24	22.08	22.28	43.87	2.37	2.39		
17-Jun	2.09	2.16	2.12	23.29	21.13	40.41	2.32	2.38		
18-Jun	1.92	2.19	2.09	24.18	23.18	39.57	2.28	2.37		
19-Jun	2.17	2.37	2.19	23.28	23.59	43.77	2.24	2.36		
22-Jun	2.05	2.15	2.14	25.29	24.25	42.19	2.20	2.35		
23-Jun	1.87	2.15	2.06	25.66	24.74	39.72	2.16	2.35		
24-Jun	2.07	2.21	2.21	27.77	26.24	46.09	2.16	2.34		
25-Jun	2.15	2.38	2.32	35.82	29.75	50.24	2.16	2.33		
26-Jun	2.30	2.51	2.41	56.21	39.93	53.40	2.20	2.32		
29-Jun	2.40	2.48	2.41	71.88	54.64	53.40	2.22	2.32		
30-Jun	2.25	2.37	2.27	76.23	68.11	47.91	2.23	2.31		
01-Jul	1.97	2.26	2.13	62.50	70.20	43.13	2.24	2.30		
02-Jul	2.13	2.25	2.23	53.13	63.95	47.18	2.24	2.28		
06-Jul	2.17	2.31	2.31	55.21	56.94	50.23	2.26	2.27		
07-Jul	2.26	2.35	2.35	66.67	58.33	51.74	2.29	2.27		
08-Jul	2.15	2.47	2.35	72.92	64.93	51.74	2.31	2.25		
09-Jul	2.28	2.50	2.36	75.52	71.70	52.16	2.31	2.25		
10-Jul	2.39	2.52	2.39	77.19	75.21	53.46	2.31	2.25		
13-Jul	2.44	2.78	2.58	78.19	76.97	60.76	2.33	2.26		
14-Jul	2.52	2.62	2.52	75.31	76.90	57.68	2.36	2.28		
15-Jul	2.45	2.64	2.61	74.98	76.16	60.88	2.41	2.30		
16-Jul	2.46	2.65	2.53	72.02	74.10	56.77	2.44	2.31		
17-Jul	2.40	2.51	2.51	71.60	72.87	55.76	2.47	2.33		
20-Jul	2.48	2.78	2.65	73.25	72.29	61.00	2.50	2.36		
21-Jul	2.70	2.94	2.82	79.42	74.76	66.24	2.55	2.39		
22-Jul	2.82	3.04	3.00	89.06	80.58	70.72	2.62	2.43	3.00	
23-Jul	2.98	3.07	3.06	94.05	87.51	72.05	2.70	2.48	3.06	
24-Jul	3.08	3.23	3.19	96.94	93.35	74.73	2.77	2.52	3.19	
27-Jul	3.13	3.40	3.23	93.87	94.95	75.51	2.84	2.57	3.23	
28-Jul	3.25	3.35	3.32	91.85	94.22	77.21	2.92	2.61	3.32	
29-Jul	3.39	3.54	3.45	90.48	92.07	79.44	3.03	2.66	3.45	
30-Jul	3.60	3.79	3.65	91.65	91.33	82.30	3.15	2.73	3.65	
31-Jul	3.37	3.64	3.49	86.84	89.66	73.49	3.25	2.79	3.49	
03-Aug	3.16	3.44	3.29	77.46	85.32	64.23	3.30	2.84		
04-Aug	3.36	3.51	3.45	72.66	78.99	67.74	3.35	2.90		
05-Aug	3.38	3.52	3.45	71.70	73.94	67.74	3.39	2.95		
06-Aug	3.20	3.30	3.28	70.72	71.69	60.45	3.40	2.99		
07-Aug	3.23	3.57	3.39	66.64	69.69	63.20	3.42	3.04		
10-Aug	3.36	3.65	3.51	65.17	67.51	65.99	3.44	3.09		
11-Aug	3.33	3.48	3.38	61.27	64.36	60.63	3.43	3.13		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
12-Aug	3.22	3.57	3.40	55.20	60.55	61.16	3.40	3.17		
13-Aug	3.34	3.61	3.45	47.65	54.70	62.50	3.40	3.21		
14-Aug	3.24	3.44	3.36	41.77	48.20	58.58	3.41	3.25		
17-Aug	3.25	3.46	3.27	32.56	40.66	54.87	3.39	3.29		
18-Aug	3.33	3.49	3.41	29.63	34.65	59.20	3.38	3.33		
19-Aug	3.29	3.45	3.41	36.05	32.75	59.20	3.40	3.35		
20-Aug	3.42	3.76	3.56	52.46	39.38	63.54	3.42	3.38		
21-Aug	3.34	3.53	3.45	54.11	47.54	58.61	3.41	3.40		
24-Aug	3.44	3.58	3.52	56.15	54.24	60.70	3.43	3.42		
25-Aug	3.58	3.63	3.58	56.55	55.60	62.45	3.45	3.43		
26-Aug	3.66	3.92	3.76	67.38	60.03	67.17	3.48	3.45		
27-Aug	3.50	3.73	3.58	65.48	63.13	59.16	3.50	3.46		
28-Aug	3.55	3.78	3.70	65.71	66.19	62.38	3.55	3.46		
31-Aug	3.70	3.90	3.82	68.57	66.59	65.32	3.60	3.48		
01-Sep	3.73	3.93	3.92	84.28	72.85	67.60	3.65	3.51		
02-Sep	3.95	4.25	4.08	89.14	80.66	70.89	3.71	3.54	4.08	
03-Sep	3.98	4.18	4.11	89.24	87.55	71.48	3.79	3.57	4.11	
04-Sep	3.99	4.19	4.19	87.64	88.67	73.03	3.86	3.61	4.19	
08-Sep	4.06	4.16	4.11	88.39	88.42	68.98	3.92	3.65		
09-Sep	3.79	4.08	3.92	80.97	85.67	60.40	3.94	3.67		
10-Sep	3.63	3.86	3.74	64.37	77.91	53.60	3.95	3.68		
11-Sep	3.78	4.13	3.94	56.47	67.27	59.11	3.98	3.71		
14-Sep	3.73	4.03	3.83	49.89	56.91	55.23	3.98	3.73		
15-Sep	3.92	4.10	3.94	54.80	53.72	58.19	3.98	3.75		
16-Sep	3.90	4.24	4.06	59.11	54.60	61.20	3.98	3.79		
17-Sep	3.94	4.08	4.00	65.87	59.93	58.91	3.97	3.82		
18-Sep	4.05	4.17	4.07	69.97	64.99	60.75	3.96	3.85		
21-Sep	3.92	4.17	4.12	71.43	69.09	62.06	3.96	3.88		
22-Sep	3.77	3.97	3.97	68.28	69.89	56.03	3.96	3.90		
23-Sep	3.73	3.91	3.91	59.92	66.54	53.78	3.98	3.92		
24-Sep	3.90	3.94	3.94	50.52	59.57	54.76	3.98	3.94		
25-Sep	3.98	4.16	4.03	54.10	54.85	57.66	4.00	3.95		
28-Sep	4.17	4.32	4.21	66.82	57.15	62.79	4.03	3.98		
29-Sep	4.27	4.53	4.40	78.40	66.44	67.29	4.07	4.01		
30-Sep	4.39	4.45	4.41	84.87	76.69	67.52	4.12	4.04		
01-Oct	4.14	4.29	4.22	77.27	80.18	59.25	4.13	4.06		
02-Oct	4.10	4.35	4.17	67.08	76.41	57.27	4.14	4.06		
05-Oct	4.02	4.33	4.13	55.42	66.59	55.66	4.16	4.06		
06-Oct	4.15	4.32	4.30	58.75	60.42	60.71	4.20	4.07		
07-Oct	4.16	4.20	4.19	59.58	57.92	56.24	4.23	4.07		
08-Oct	4.02	4.37	4.22	63.33	60.56	57.17	4.25	4.09		
09-Oct	4.17	4.44	4.37	66.25	63.06	61.55	4.27	4.12		
12-Oct	4.20	4.28	4.27	69.58	66.39	57.34	4.25	4.13		
13-Oct	4.15	4.30	4.16	62.92	66.25	53.04	4.23	4.15		
14-Oct	4.00	4.28	4.18	48.38	60.29	53.72	4.22	4.16		
15-Oct	4.12	4.44	4.24	40.97	50.76	55.79	4.23	4.17		
16-Oct	4.16	4.34	4.19	39.17	42.84	53.64	4.24	4.18		
19-Oct	4.18	4.41	4.21	42.60	40.91	54.40	4.23	4.18		
20-Oct	4.36	4.41	4.39	57.05	46.27	60.62	4.25	4.20		
21-Oct	4.42	4.59	4.47	71.65	57.10	63.04	4.28	4.22		
22-Oct	4.28	4.59	4.43	80.39	69.70	61.02	4.28	4.24		
23-Oct	4.20	4.28	4.26	65.54	72.53	53.23	4.28	4.26		
26-Oct	4.18	4.29	4.22	51.41	65.78	51.56	4.29	4.27		
27-Oct	4.16	4.25	4.21	38.98	51.98	51.13	4.29	4.27		
28-Oct	4.13	4.18	4.16	33.33	41.24	48.93	4.28	4.26		
29-Oct	4.13	4.42	4.29	37.29	36.53	54.43	4.29	4.25		
30-Oct	4.11	4.22	4.21	37.29	35.97	50.80	4.29	4.25		
02-Nov	4.26	4.37	4.26	42.94	39.17	52.91	4.28	4.26		
03-Nov	4.42	4.58	4.44	49.47	43.23	59.63	4.28	4.27		
04-Nov	4.61	4.72	4.61	64.93	52.45	64.75	4.30	4.28		
05-Nov	4.48	4.82	4.63	74.65	63.02	65.30	4.34	4.31		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
06-Nov	4.49	4.78	4.61	75.21	71.60	64.21	4.38	4.32		
09-Nov	4.46	4.64	4.59	70.42	73.43	63.07	4.42	4.33		
10-Nov	4.39	4.68	4.56	67.14	70.92	61.32	4.47	4.35		
11-Nov	4.38	4.62	4.51	62.44	66.67	58.41	4.49	4.37		
12-Nov	4.50	4.64	4.58	61.97	63.85	61.19	4.53	4.38		
13-Nov	4.52	4.59	4.54	61.03	61.82	58.77	4.56	4.40		
16-Nov	4.47	4.81	4.61	65.73	62.91	61.63	4.58	4.42		
17-Nov	4.51	4.66	4.61	67.14	64.63	61.63	4.58	4.44		
18-Nov	4.68	4.73	4.71	75.12	69.33	65.58	4.59	4.45		
19-Nov	4.68	4.98	4.85	78.96	73.74	70.21	4.62	4.47	4.85	
20-Nov	4.81	4.94	4.85	81.59	78.56	70.21	4.65	4.49	4.85	
23-Nov	4.75	5.02	4.87	78.95	79.83	70.85	4.68	4.52	4.87	
24-Nov	4.59	4.84	4.69	67.78	76.11	58.50	4.70	4.54		
25-Nov	4.89	5.00	4.89	68.23	71.65	65.66	4.74	4.57		
27-Nov	4.85	5.10	4.97	70.02	68.68	68.04	4.78	4.61		
30-Nov	4.62	4.90	4.77	71.93	70.06	57.35	4.80	4.64		
01-Dec	4.66	4.77	4.68	59.26	67.07	53.30	4.81	4.66		
02-Dec	4.79	4.96	4.87	53.11	61.43	59.77	4.83	4.69		
03-Dec	4.84	4.95	4.87	56.22	56.19	59.77	4.83	4.71		
04-Dec	4.71	4.90	4.77	58.20	55.84	55.11	4.82	4.72		
07-Dec	4.68	4.95	4.79	52.86	55.76	55.85	4.81	4.72		
08-Dec	4.81	4.97	4.95	55.22	55.43	61.35	4.84	4.74		
09-Dec	4.63	4.81	4.80	53.07	53.72	54.50	4.83	4.75		
10-Dec	4.46	4.80	4.64	46.63	51.64	48.30	4.79	4.75		
11-Dec	4.35	4.51	4.49	29.32	43.01	43.32	4.76	4.75		
14-Dec	4.57	4.84	4.66	29.38	35.11	49.65	4.76	4.76		

SAMPLE 2

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.71	3.00	2.82							
04-Dec	2.79	2.92	2.91							
05-Dec	2.77	2.83	2.80							
08-Dec	2.52	2.65	2.65							
09-Dec	2.40	2.66	2.57							
10-Dec	2.65	2.70	2.69							
11-Dec	2.79	3.01	2.89							
12-Dec	2.74	2.98	2.89							
15-Dec	2.59	2.80	2.73				2.77			
16-Dec	2.58	2.87	2.73				2.76			
17-Dec	2.54	2.65	2.54				2.72			
18-Dec	2.48	2.72	2.58				2.70			
19-Dec	2.55	2.81	2.64				2.70			
22-Dec	2.36	2.71	2.53				2.69			
23-Dec	2.22	2.53	2.40				2.66			
24-Dec	2.25	2.44	2.27	18.42		28.38	2.59			
26-Dec	2.31	2.59	2.40	17.30		34.57	2.54			
29-Dec	2.23	2.40	2.26	11.39	15.70	31.42	2.48			
30-Dec	1.95	2.30	2.15	15.57	14.75	29.17	2.42			
31-Dec	1.95	2.18	1.99	9.23	12.07	26.23	2.36			
02-Jan	2.15	2.26	2.19	15.31	13.37	35.04	2.31	2.55		
05-Jan	2.29	2.43	2.37	24.24	16.26	41.79	2.28	2.53		
06-Jan	2.37	2.69	2.52	43.64	27.73	46.75	2.28	2.51		
07-Jan	2.49	2.74	2.66	63.39	43.76	50.95	2.31	2.51		
08-Jan	2.46	2.76	2.56	71.81	59.61	48.03	2.34	2.50		
09-Jan	2.31	2.55	2.47	71.32	68.84	45.51	2.35	2.50		
12-Jan	2.26	2.35	2.34	59.85	67.66	42.07	2.36	2.48		
13-Jan	2.13	2.30	2.22	47.32	59.49	39.13	2.37	2.45		
14-Jan	2.05	2.34	2.18	36.63	47.93	38.17	2.39	2.42		
15-Jan	2.10	2.27	2.21	31.28	38.41	39.37	2.39	2.39		
16-Jan	1.86	2.18	2.02	26.09	31.33	34.78	2.35	2.36		
20-Jan	1.92	2.31	2.12	26.26	27.87	38.82	2.31	2.34		
21-Jan	1.85	2.16	1.97	19.95	24.10	35.29	2.23	2.31		
22-Jan	1.90	2.05	2.02	20.25	22.15	37.34	2.17	2.28		
23-Jan	1.69	2.08	1.88	16.54	18.92	34.08	2.11	2.25		
26-Jan	1.63	1.85	1.81	17.46	18.08	32.55	2.05	2.22		
27-Jan	1.83	2.03	1.99	21.85	18.62	40.00	2.02	2.21		
28-Jan	2.08	2.20	2.18	32.15	23.82	46.70	2.02	2.20		
29-Jan	1.98	2.17	2.13	44.96	32.99	45.26	2.01	2.19		
30-Jan	2.12	2.37	2.31	64.97	47.36	51.08	2.05	2.20		
02-Feb	2.40	2.57	2.51	79.95	63.29	56.59	2.09	2.22		
03-Feb	2.62	2.74	2.62	91.57	78.83	59.31	2.16	2.24		
04-Feb	2.53	2.75	2.68	92.19	87.90	60.75	2.23	2.26		
05-Feb	2.59	2.86	2.73	90.79	91.51	61.96	2.33	2.27		
06-Feb	2.44	2.80	2.64	88.43	90.47	58.47	2.42	2.27		
09-Feb	2.54	2.62	2.56	82.38	87.20	55.47	2.48	2.27		
10-Feb	2.55	2.77	2.61	79.13	83.32	56.96	2.53	2.27		
11-Feb	2.62	2.98	2.79	80.40	80.64	61.88	2.61	2.29		
12-Feb	2.68	2.95	2.82	84.58	81.37	62.65	2.66	2.32		
13-Feb	2.70	2.95	2.76	84.98	83.32	60.05	2.69	2.35		
17-Feb	2.68	2.94	2.82	84.34	84.63	61.76	2.71	2.38		
18-Feb	2.43	2.65	2.63	76.62	81.98	53.89	2.71	2.41		
19-Feb	2.42	2.64	2.46	62.84	74.60	47.99	2.68	2.42		
20-Feb	2.46	2.66	2.48	39.44	59.64	48.70	2.66	2.45		
23-Feb	2.40	2.47	2.45	20.65	40.98	47.65	2.65	2.47		
24-Feb	2.29	2.51	2.47	16.17	25.42	48.45	2.63	2.50		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
25-Feb	2.22	2.42	2.42	20.34	19.05	46.54	2.59	2.53		
26-Feb	2.23	2.37	2.26	19.22	18.58	40.96	2.53	2.54		
27-Feb	2.17	2.31	2.28	15.05	18.21	41.90	2.47	2.54		
02-Mar	2.25	2.45	2.30	11.63	15.30	42.87	2.42	2.55		
03-Mar	2.23	2.30	2.24	12.76	13.15	40.67	2.37	2.55		
04-Mar	2.16	2.38	2.35	16.25	13.55	46.14	2.36	2.54		
05-Mar	2.41	2.52	2.45	23.13	17.38	50.61	2.36	2.53		
06-Mar	2.28	2.47	2.29	25.81	21.73	44.28	2.34	2.51		
09-Mar	2.07	2.16	2.10	19.49	22.81	38.18	2.30	2.48		
10-Mar	1.86	2.09	1.98	12.25	19.18	34.91	2.25	2.45		
11-Mar	1.64	1.92	1.78	11.27	14.34	30.26	2.20	2.42		
12-Mar	1.60	1.76	1.66	11.75	11.76	27.86	2.13	2.37		1.66
13-Mar	1.71	1.94	1.74	11.82	11.61	31.74	2.07	2.32		
16-Mar	1.48	1.71	1.66	13.02	12.20	30.00	2.00	2.27		
17-Mar	1.41	1.65	1.54	14.75	13.19	27.56	1.91	2.21		1.54
18-Mar	1.30	1.40	1.35	11.04	12.93	24.20	1.79	2.14		1.35
19-Mar	1.31	1.58	1.45	9.37	11.72	29.10	1.70	2.08		1.45
20-Mar	1.44	1.67	1.60	13.66	11.36	35.80	1.64	2.04		
23-Mar	1.26	1.58	1.43	16.79	13.27	32.10	1.58	1.99		
24-Mar	1.40	1.76	1.59	21.42	17.29	38.54	1.56	1.95		
25-Mar	1.45	1.56	1.52	20.39	19.54	36.89	1.54	1.90		
26-Mar	1.45	1.59	1.52	25.52	22.45	36.89	1.52	1.86		
27-Mar	1.48	1.68	1.63	31.65	25.85	41.45	1.51	1.83		
30-Mar	1.43	1.63	1.47	34.78	30.65	37.24	1.51	1.79		
31-Mar	1.34	1.42	1.39	31.53	32.65	35.30	1.51	1.75		
01-Apr	1.43	1.60	1.46	26.47	30.93	38.32	1.51	1.71		
02-Apr	1.39	1.65	1.49	31.51	29.84	39.62	1.50	1.67		
03-Apr	1.30	1.58	1.46	38.47	32.15	38.74	1.50	1.62		
06-Apr	1.53	1.59	1.56	48.67	39.55	43.26	1.50	1.59		
07-Apr	1.29	1.58	1.49	48.67	45.27	40.98	1.50	1.56		
08-Apr	1.41	1.71	1.57	56.00	51.11	44.58	1.50	1.54		
09-Apr	1.35	1.59	1.39	44.67	49.78	38.84	1.48	1.52		
13-Apr	1.34	1.56	1.52	45.65	48.77	44.41	1.48	1.52		
14-Apr	1.42	1.59	1.51	42.44	44.25	44.07	1.49	1.50		
15-Apr	1.34	1.52	1.45	46.47	44.85	42.04	1.49	1.49		
16-Apr	1.56	1.64	1.64	57.94	48.95	49.92	1.51	1.50		
17-Apr	1.55	1.65	1.62	66.67	57.02	49.16	1.53	1.51		
20-Apr	1.29	1.57	1.45	66.67	63.76	43.17	1.52	1.51		
21-Apr	1.40	1.60	1.50	55.56	62.96	45.28	1.52	1.51		
22-Apr	1.59	1.65	1.63	56.35	59.52	50.44	1.52	1.52		
23-Apr	1.63	1.77	1.64	67.96	59.95	50.82	1.55	1.52		
24-Apr	1.29	1.63	1.46	63.10	62.47	44.18	1.54	1.52		
27-Apr	1.48	1.56	1.55	54.17	61.74	47.85	1.55	1.52		
28-Apr	1.53	1.76	1.66	55.56	57.61	52.00	1.57	1.52		
29-Apr	1.60	1.89	1.80	72.08	60.60	56.72	1.59	1.54		
30-Apr	1.70	1.85	1.83	84.03	70.56	57.68	1.61	1.56		
01-May	1.82	2.07	1.87	83.12	79.74	58.99	1.66	1.58		
04-May	1.68	1.79	1.74	74.02	80.39	53.24	1.69	1.59		
05-May	1.94	1.97	1.94	71.79	76.31	59.74	1.72	1.61		
06-May	1.84	2.08	1.91	73.17	72.99	58.43	1.75	1.63		
07-May	1.76	1.81	1.76	73.77	72.91	52.25	1.78	1.64		
08-May	1.74	1.77	1.76	65.82	70.92	52.25	1.81	1.65		
11-May	1.67	1.86	1.74	58.65	66.08	51.40	1.82	1.67		
12-May	1.63	1.79	1.79	59.92	61.46	53.42	1.82	1.68		
13-May	1.43	1.81	1.62	54.01	57.52	46.37	1.79	1.68		
14-May	1.73	1.82	1.73	50.41	54.78	50.89	1.78	1.70		
15-May	1.42	1.55	1.54	35.37	46.59	43.99	1.75	1.69		
18-May	1.55	1.81	1.70	35.59	40.45	50.12	1.73	1.70		
19-May	1.55	1.67	1.62	30.30	33.75	47.33	1.70	1.70		
20-May	1.74	1.90	1.82	44.44	36.78	54.20	1.70	1.72		
21-May	1.55	1.77	1.74	46.46	40.40	51.31	1.70	1.72		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
22-May	1.48	1.70	1.64	47.47	46.13	47.89	1.69	1.72		
26-May	1.45	1.69	1.57	34.85	42.93	45.59	1.66	1.73		
27-May	1.20	1.47	1.39	27.73	36.69	40.25	1.64	1.72		
28-May	1.42	1.53	1.47	29.48	30.69	43.42	1.61	1.71		
29-May	1.34	1.51	1.49	35.71	30.98	44.22	1.60	1.70		
01-Jun	1.38	1.72	1.56	43.81	36.33	47.04	1.59	1.69		
02-Jun	1.31	1.55	1.46	43.33	40.95	43.65	1.57	1.67		
03-Jun	1.32	1.70	1.50	43.81	43.65	45.34	1.54	1.65		
04-Jun	1.41	1.68	1.61	46.19	44.44	49.82	1.52	1.64		
05-Jun	1.42	1.74	1.61	53.33	47.78	49.82	1.52	1.62		
08-Jun	1.79	1.93	1.80	66.44	55.32	56.88	1.54	1.63		
09-Jun	1.53	1.86	1.66	67.93	62.57	51.17	1.57	1.62		
10-Jun	1.35	1.46	1.46	60.27	64.88	44.31	1.57	1.61		
11-Jun	1.39	1.64	1.51	47.03	58.41	46.25	1.57	1.60		
12-Jun	1.50	1.70	1.52	40.64	49.32	46.65	1.57	1.59		
15-Jun	1.39	1.47	1.47	41.10	42.92	44.85	1.57	1.58		
16-Jun	1.32	1.37	1.33	28.02	36.58	40.19	1.55	1.57		
17-Jun	1.32	1.50	1.39	17.71	28.94	42.93	1.53	1.55		
18-Jun	1.30	1.54	1.34	7.49	17.74	41.23	1.50	1.54		
19-Jun	1.24	1.44	1.37	12.70	12.63	42.69	1.45	1.52		
22-Jun	1.28	1.37	1.28	10.33	10.17	39.52	1.41	1.50		
23-Jun	1.31	1.56	1.41	16.43	13.15	45.79	1.40	1.49		
24-Jun	1.38	1.63	1.58	26.57	17.77	52.70	1.41	1.49		
25-Jun	1.66	1.78	1.74	48.79	30.60	58.12	1.43	1.50		
26-Jun	1.66	1.72	1.68	64.24	46.53	55.55	1.46	1.51		
29-Jun	1.69	1.76	1.74	78.67	63.90	57.57	1.50	1.52		
30-Jun	1.68	1.91	1.77	80.89	74.60	58.58	1.55	1.53		
01-Jul	1.69	1.86	1.75	82.61	80.72	57.59	1.59	1.55		
02-Jul	1.57	1.79	1.73	76.12	79.87	56.57	1.63	1.56		
06-Jul	1.82	1.88	1.83	79.10	79.28	60.37	1.69	1.57		
07-Jul	1.71	1.93	1.77	79.34	78.19	57.14	1.73	1.58		
08-Jul	1.85	2.12	1.95	81.85	80.10	63.46	1.77	1.58		
09-Jul	1.91	1.92	1.92	78.26	79.81	61.82	1.79	1.60		
10-Jul	1.81	2.14	1.96	79.01	79.70	63.19	1.82	1.62		
13-Jul	1.91	2.17	2.07	81.57	79.61	66.71	1.86	1.65		
14-Jul	1.78	2.01	1.95	79.86	80.15	59.97	1.88	1.67		
15-Jul	1.60	1.93	1.79	65.73	75.72	52.37	1.89	1.68		
16-Jul	1.55	1.85	1.68	43.26	62.95	47.88	1.88	1.70		
17-Jul	1.71	1.96	1.85	35.34	48.11	54.39	1.88	1.72		
20-Jul	1.68	1.89	1.70	31.18	36.60	48.62	1.87	1.74		
21-Jul	1.43	1.81	1.61	32.30	32.94	45.50	1.84	1.75		
22-Jul	1.69	1.77	1.71	28.79	30.76	49.39	1.81	1.77		
23-Jul	1.68	1.96	1.78	36.49	32.52	51.97	1.79	1.79		
24-Jul	1.57	1.70	1.60	36.04	33.77	45.54	1.74	1.79		
27-Jul	1.45	1.71	1.58	30.18	34.23	44.87	1.70	1.78		
28-Jul	1.32	1.50	1.43	18.73	28.31	40.14	1.66	1.77		
29-Jul	1.27	1.44	1.33	13.29	20.73	37.32	1.62	1.75		
30-Jul	1.21	1.32	1.30	9.66	13.89	36.49	1.56	1.73		
31-Jul	1.09	1.15	1.13	6.80	9.92	32.13	1.50	1.70		
03-Aug	1.11	1.38	1.26	11.09	9.18	38.21	1.46	1.68		
04-Aug	1.32	1.59	1.43	20.99	12.96	45.13	1.43	1.66		
05-Aug	1.37	1.67	1.56	37.55	23.21	49.76	1.40	1.65		
06-Aug	1.59	1.74	1.71	54.79	37.78	54.53	1.41	1.64		
07-Aug	1.45	1.58	1.53	58.62	50.32	48.57	1.41	1.62		
10-Aug	1.61	1.84	1.72	64.75	59.39	54.26	1.44	1.61		
11-Aug	1.73	2.10	1.92	68.39	63.92	59.35	1.51	1.60		
12-Aug	1.70	1.83	1.82	75.62	69.59	55.99	1.56	1.59		
13-Aug	1.65	1.88	1.68	70.96	71.66	51.59	1.63	1.59		
14-Aug	1.70	1.90	1.84	68.32	71.63	55.86	1.69	1.59		
17-Aug	1.73	1.95	1.93	71.95	70.41	58.10	1.75	1.60		
18-Aug	1.93	2.13	2.05	83.24	74.50	60.94	1.80	1.62		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
19-Aug	2.00	2.08	2.08	90.22	81.80	61.64	1.84	1.64		
20-Aug	1.93	2.18	2.02	90.85	88.11	59.35	1.90	1.65		
21-Aug	1.86	2.14	1.99	86.05	89.04	58.18	1.93	1.66		
24-Aug	2.11	2.19	2.17	86.84	87.91	62.89	1.95	1.69		
25-Aug	2.07	2.24	2.17	88.87	87.25	62.89	1.99	1.72		
26-Aug	2.13	2.35	2.18	89.94	88.55	63.16	2.05	1.75		
27-Aug	2.10	2.34	2.20	83.99	87.60	63.72	2.09	1.79		
28-Aug	2.04	2.23	2.14	76.95	83.63	60.73	2.11	1.83		
31-Aug	2.20	2.30	2.29	80.39	80.44	65.14	2.14	1.89		
01-Sep	2.11	2.36	2.28	83.39	80.24	64.62	2.16	1.94		
02-Sep	2.00	2.37	2.18	83.93	82.57	59.49	2.18	1.97		
03-Sep	2.27	2.48	2.34	80.57	82.63	64.36	2.22	2.01		
04-Sep	2.25	2.60	2.43	76.67	80.39	66.79	2.25	2.05		
08-Sep	2.19	2.44	2.35	74.86	77.37	62.71	2.27	2.08		
09-Sep	2.21	2.54	2.34	69.37	73.63	62.20	2.28	2.11		
10-Sep	2.18	2.41	2.33	64.86	69.70	61.66	2.30	2.13		
11-Sep	2.08	2.24	2.16	51.68	61.97	53.18	2.30	2.15		
14-Sep	2.02	2.18	2.04	32.28	49.61	48.15	2.27	2.17		
15-Sep	1.92	2.22	2.09	19.44	34.47	50.26	2.25	2.18		
16-Sep	2.15	2.36	2.23	25.75	25.83	55.70	2.26	2.19		
17-Sep	2.37	2.43	2.42	48.04	31.08	61.81	2.27	2.21		
18-Sep	2.21	2.39	2.33	59.80	44.53	57.75	2.25	2.22		
21-Sep	2.37	2.55	2.46	71.08	59.64	61.66	2.27	2.24		
22-Sep	2.36	2.59	2.50	75.00	68.63	62.81	2.28	2.27		
23-Sep	2.55	2.80	2.62	81.42	75.83	66.07	2.32	2.29		
24-Sep	2.75	2.97	2.78	82.25	79.56	69.87	2.39	2.32		
25-Sep	2.85	3.04	2.92	83.58	82.41	72.75	2.48	2.35	2.92	
28-Sep	2.82	2.94	2.93	87.12	84.32	72.95	2.58	2.39	2.93	
29-Sep	2.88	3.11	3.01	90.35	87.02	74.54	2.66	2.43	3.01	
30-Sep	3.11	3.11	3.11	93.93	90.47	76.42	2.74	2.47	3.11	
01-Oct	2.88	3.09	2.91	91.60	91.96	65.95	2.80	2.50		
02-Oct	2.77	2.92	2.92	89.08	91.53	66.20	2.86	2.53		
05-Oct	2.86	3.07	3.06	87.34	89.34	69.56	2.92	2.57		
06-Oct	2.94	3.26	3.14	89.13	88.52	71.32	2.98	2.60	3.14	
07-Oct	2.86	3.16	3.03	87.15	87.87	65.71	3.00	2.63		
08-Oct	2.84	2.96	2.86	74.07	83.45	58.10	3.00	2.66		
09-Oct	2.85	2.95	2.94	66.03	75.75	60.42	3.00	2.69		
12-Oct	3.08	3.25	3.10	65.82	68.64	64.64	3.01	2.73		
13-Oct	2.77	2.98	2.95	60.37	64.08	58.36	2.99	2.78		
14-Oct	2.87	3.12	2.93	49.78	58.66	57.56	2.99	2.82		
15-Oct	2.68	2.95	2.86	34.30	48.15	54.72	2.99	2.85		
16-Oct	2.61	2.77	2.72	26.87	36.98	49.47	2.95	2.86		
19-Oct	2.43	2.61	2.58	22.01	27.73	44.83	2.89	2.87		
20-Oct	2.74	2.95	2.75	24.52	24.47	50.85	2.85	2.89		
21-Oct	2.81	2.86	2.82	34.54	27.02	53.12	2.85	2.90		
22-Oct	2.87	3.10	2.94	49.00	36.02	56.80	2.85	2.92		
23-Oct	2.83	3.06	3.03	60.24	47.93	59.38	2.84	2.93		
26-Oct	3.17	3.20	3.17	74.66	61.30	63.07	2.87	2.94		
27-Oct	3.19	3.42	3.26	82.12	72.34	65.26	2.90	2.96		
28-Oct	3.33	3.55	3.41	87.19	81.33	68.59	2.96	2.98		
29-Oct	3.52	3.73	3.60	87.11	85.48	72.23	3.06	3.00	3.60	
30-Oct	3.54	3.59	3.55	87.88	87.40	69.94	3.17	3.03		
02-Nov	3.40	3.71	3.56	87.69	87.56	70.14	3.26	3.06	3.56	
03-Nov	3.52	3.71	3.55	86.41	87.33	69.63	3.34	3.08		
04-Nov	3.37	3.73	3.55	86.41	86.84	69.63	3.41	3.10		
05-Nov	3.42	3.71	3.51	85.13	85.98	67.36	3.46	3.13		
06-Nov	3.49	3.71	3.63	86.38	85.97	70.47	3.51	3.16	3.63	
09-Nov	3.63	3.74	3.69	89.20	86.90	71.91	3.56	3.20	3.69	
10-Nov	3.65	3.94	3.78	90.04	88.54	73.97	3.60	3.23	3.78	
11-Nov	3.68	3.89	3.82	89.80	89.68	74.85	3.63	3.27	3.82	
12-Nov	3.92	4.06	4.02	90.09	89.98	78.72	3.68	3.32	4.02	

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
13-Nov	3.92	4.21	4.09	90.98	90.29	79.89	3.74	3.38	4.09	
16-Nov	3.84	4.11	3.93	83.97	88.35	70.38	3.78	3.44	3.93	
17-Nov	4.09	4.27	4.10	79.18	84.71	73.93	3.84	3.51	4.10	
18-Nov	4.13	4.42	4.27	78.34	80.50	76.91	3.93	3.58	4.27	
19-Nov	4.19	4.41	4.22	82.59	80.03	74.22	3.99	3.65	4.22	
20-Nov	4.15	4.31	4.20	81.90	80.94	73.12	4.05	3.71	4.20	
23-Nov	4.16	4.28	4.17	78.73	81.08	71.41	4.09	3.77	4.17	
24-Nov	4.18	4.28	4.24	79.08	79.90	73.00	4.14	3.82	4.24	
25-Nov	4.00	4.19	4.04	72.44	76.75	62.35	4.14	3.85		
27-Nov	3.76	4.00	3.93	59.70	70.41	57.39	4.12	3.88		
30-Nov	3.96	4.05	4.05	49.69	60.61	61.03	4.14	3.90		
01-Dec	3.92	3.97	3.92	40.79	50.06	55.50	4.12	3.92		
02-Dec	3.82	3.92	3.88	34.19	41.55	53.88	4.07	3.93		
03-Dec	3.85	4.00	3.90	23.94	32.97	54.59	4.04	3.95		
04-Dec	3.87	4.12	4.04	27.27	28.47	59.33	4.02	3.97		
07-Dec	3.93	4.09	3.94	30.30	27.17	54.92	3.99	3.99		
08-Dec	3.83	4.05	3.95	32.83	30.13	55.28	3.96	4.01		
09-Dec	3.60	3.82	3.77	25.68	29.60	47.91	3.93	4.01		
10-Dec	3.88	4.09	3.92	31.62	30.04	53.48	3.93	4.02		
11-Dec	3.87	3.97	3.87	35.25	30.85	51.50	3.91	4.02		
14-Dec	3.78	3.93	3.83	39.53	35.47	49.91	3.90	4.01		

SAMPLE 3

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.83	3.05	2.93							
04-Dec	2.93	3.18	3.07							
05-Dec	2.99	3.34	3.17							
08-Dec	3.21	3.38	3.23							
09-Dec	3.16	3.30	3.30							
10-Dec	3.11	3.37	3.23							
11-Dec	3.27	3.32	3.29							
12-Dec	3.24	3.34	3.30							
15-Dec	3.20	3.40	3.31				3.20			
16-Dec	3.15	3.19	3.16				3.23			
17-Dec	3.25	3.48	3.34				3.26			
18-Dec	3.24	3.43	3.38				3.28			
19-Dec	3.16	3.43	3.32				3.29			
22-Dec	3.24	3.50	3.31				3.29			
23-Dec	3.02	3.34	3.18				3.29			
24-Dec	3.00	3.25	3.20	52.23		56.70	3.28			
26-Dec	2.97	3.05	3.03	32.12		47.70	3.25			
29-Dec	3.11	3.20	3.19	31.34	38.56	54.95	3.23			
30-Dec	3.05	3.25	3.09	25.16	29.54	50.26	3.23			
31-Dec	3.10	3.20	3.16	33.33	29.94	53.27	3.21			
02-Jan	3.05	3.13	3.05	24.53	27.67	48.32	3.17	3.20		
05-Jan	3.11	3.25	3.14	27.67	28.51	52.23	3.15	3.21		
06-Jan	3.01	3.32	3.15	27.04	26.42	52.66	3.13	3.22		
07-Jan	2.76	2.99	2.95	30.57	28.43	44.14	3.11	3.21		
08-Jan	2.67	2.95	2.83	26.31	27.97	39.96	3.07	3.19		
09-Jan	2.71	2.90	2.88	23.42	26.76	42.40	3.05	3.17		
12-Jan	2.61	2.82	2.78	21.23	23.65	38.98	3.00	3.14		
13-Jan	2.96	3.13	2.97	31.24	25.29	47.63	2.99	3.13		
14-Jan	2.79	3.06	2.93	37.83	30.10	46.15	2.96	3.11		
15-Jan	3.05	3.18	3.09	54.00	41.02	52.51	2.97	3.10		
16-Jan	2.95	3.29	3.12	61.50	51.11	53.62	2.97	3.10		
20-Jan	3.15	3.34	3.23	74.79	63.43	57.53	2.98	3.09		
21-Jan	3.35	3.51	3.36	80.03	72.11	61.65	3.02	3.09		
22-Jan	3.26	3.62	3.43	83.15	79.32	63.69	3.09	3.10		
23-Jan	3.48	3.73	3.57	83.41	82.20	67.42	3.16	3.11		
26-Jan	3.34	3.47	3.44	80.34	82.30	61.13	3.24	3.12		
27-Jan	3.33	3.51	3.50	79.76	81.17	62.86	3.30	3.14		
28-Jan	3.18	3.56	3.36	73.51	77.87	56.56	3.34	3.15		
29-Jan	3.35	3.58	3.51	75.60	76.29	61.06	3.39	3.17		
30-Jan	3.23	3.61	3.42	73.21	74.11	57.23	3.42	3.18		
02-Feb	3.32	3.49	3.39	72.17	73.66	55.97	3.44	3.20		
03-Feb	3.08	3.43	3.24	61.34	68.91	50.04	3.43	3.20		
04-Feb	3.06	3.30	3.24	49.63	61.05	50.04	3.41	3.21		
05-Feb	3.31	3.47	3.41	48.01	52.99	56.15	3.39	3.22		
06-Feb	3.33	3.53	3.52	54.94	50.86	59.59	3.40	3.25		
09-Feb	3.60	3.69	3.65	71.90	58.28	63.26	3.42	3.29		
10-Feb	3.45	3.72	3.60	79.10	68.65	60.97	3.44	3.32		
11-Feb	3.74	3.86	3.79	86.64	79.21	66.01	3.47	3.37		
12-Feb	3.61	3.72	3.69	83.53	83.09	61.51	3.50	3.40		
13-Feb	3.70	3.93	3.80	85.02	85.06	64.39	3.55	3.45		
17-Feb	3.64	3.77	3.76	81.42	83.32	62.55	3.61	3.48		
18-Feb	3.65	3.84	3.69	79.31	81.92	59.37	3.66	3.50		
19-Feb	3.42	3.76	3.60	71.65	77.46	55.46	3.68	3.52		
20-Feb	3.64	3.91	3.75	71.26	74.07	60.17	3.70	3.54		
23-Feb	3.77	4.08	3.91	74.90	72.61	64.48	3.73	3.56		
24-Feb	3.78	3.96	3.85	80.03	75.40	61.78	3.76	3.58		
25-Feb	3.73	3.82	3.79	74.37	76.44	59.11	3.76	3.59		
26-Feb	3.54	3.75	3.71	63.49	72.63	55.66	3.76	3.60		
27-Feb	3.66	3.85	3.79	56.35	64.74	58.28	3.76	3.62		
02-Mar	3.68	3.92	3.87	58.30	59.38	60.78	3.77	3.64		
03-Mar	3.88	4.10	3.96	67.88	60.85	63.43	3.80	3.67		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	3.81	4.03	3.85	70.28	65.49	58.25	3.83	3.69		
05-Mar	3.82	4.04	3.97	74.51	70.89	61.91	3.86	3.72		
06-Mar	4.01	4.06	4.06	79.41	74.73	64.42	3.87	3.76		
09-Mar	4.03	4.28	4.14	86.24	80.05	66.54	3.90	3.80		
10-Mar	4.15	4.30	4.17	87.69	84.45	67.33	3.95	3.83		
11-Mar	4.12	4.26	4.26	87.90	87.27	69.63	4.01	3.86		
12-Mar	4.13	4.38	4.21	86.58	87.39	66.81	4.05	3.89		
13-Mar	4.34	4.45	4.38	88.94	87.80	71.09	4.11	3.91	4.38	
16-Mar	4.10	4.47	4.30	84.60	86.70	66.73	4.15	3.94		
17-Mar	4.10	4.24	4.14	79.51	84.35	58.94	4.18	3.96		
18-Mar	3.98	4.13	4.03	63.97	76.03	54.25	4.19	3.97		
19-Mar	4.12	4.31	4.19	58.25	67.25	59.32	4.20	4.00		
20-Mar	4.10	4.25	4.19	55.94	59.39	59.32	4.21	4.02		
23-Mar	4.03	4.26	4.09	54.85	56.35	54.91	4.20	4.04		
24-Mar	3.91	4.14	4.09	47.18	52.66	54.91	4.18	4.05		
25-Mar	3.95	4.00	3.98	32.15	44.73	50.15	4.15	4.06		
26-Mar	3.95	4.24	4.14	31.70	37.01	56.11	4.13	4.07		
27-Mar	4.09	4.28	4.16	32.74	32.20	56.80	4.11	4.09		
30-Mar	3.90	4.03	3.99	33.83	32.76	49.61	4.10	4.10		
31-Mar	3.75	4.04	3.95	29.40	31.99	48.07	4.09	4.11		
01-Apr	4.04	4.13	4.04	27.95	30.40	51.71	4.07	4.11		
02-Apr	4.12	4.32	4.12	39.81	32.39	54.74	4.06	4.12		
03-Apr	4.08	4.17	4.17	55.12	40.96	56.58	4.07	4.13		
06-Apr	4.02	4.15	4.09	61.57	52.17	52.88	4.07	4.13		
07-Apr	3.81	4.08	3.93	54.97	57.22	46.36	4.07	4.12		
08-Apr	3.82	4.04	3.85	36.26	50.93	43.47	4.03	4.11		
09-Apr	3.87	3.92	3.88	23.98	38.40	44.86	4.00	4.09		
13-Apr	3.88	3.97	3.93	23.98	28.07	47.18	4.00	4.08		
14-Apr	3.96	4.11	4.08	37.43	28.46	53.52	4.01	4.06		
15-Apr	4.17	4.22	4.21	56.73	39.38	58.20	4.03	4.06		
16-Apr	4.22	4.51	4.41	75.15	56.43	64.17	4.06	4.07		
17-Apr	4.44	4.67	4.57	85.56	72.48	68.10	4.11	4.10		
20-Apr	4.32	4.45	4.43	83.30	81.33	61.72	4.14	4.11		
21-Apr	4.52	4.70	4.56	82.44	83.76	65.00	4.21	4.13		
22-Apr	4.21	4.55	4.37	73.70	79.81	57.28	4.27	4.14		
23-Apr	4.09	4.29	4.24	65.17	73.77	52.67	4.31	4.15		
24-Apr	4.34	4.54	4.36	57.68	65.52	56.18	4.36	4.17		
27-Apr	4.39	4.50	4.40	58.80	60.55	57.31	4.39	4.18		
28-Apr	4.32	4.45	4.35	62.77	59.75	55.38	4.41	4.19		
29-Apr	4.15	4.52	4.34	61.05	60.87	54.98	4.40	4.20		
30-Apr	4.27	4.40	4.31	56.43	60.08	53.73	4.37	4.22		
01-May	4.31	4.58	4.43	57.53	58.34	57.86	4.37	4.24		
04-May	4.40	4.75	4.55	61.88	58.61	61.56	4.37	4.26		
05-May	4.35	4.56	4.51	65.62	61.68	59.68	4.39	4.28		
06-May	4.40	4.67	4.49	64.65	64.05	58.71	4.42	4.30		
07-May	4.44	4.49	4.49	61.62	63.96	58.71	4.43	4.32		
08-May	4.44	4.62	4.44	58.08	61.45	56.08	4.43	4.35		
11-May	4.36	4.50	4.43	55.05	58.25	55.55	4.44	4.38		
12-May	4.52	4.79	4.61	59.61	57.58	62.49	4.47	4.41		
13-May	4.67	4.91	4.79	70.00	61.55	67.89	4.53	4.44		
14-May	4.80	5.07	4.95	81.82	70.48	71.78	4.58	4.48	4.95	
15-May	4.77	5.06	4.92	84.95	78.93	70.07	4.63	4.50	4.92	
18-May	5.00	5.12	5.10	89.53	85.43	74.07	4.69	4.53	5.10	
19-May	4.94	5.23	5.08	88.67	87.72	72.90	4.76	4.56	5.08	
20-May	4.93	5.13	5.11	89.76	89.32	73.58	4.83	4.58	5.11	
21-May	5.11	5.40	5.30	87.27	88.57	77.40	4.92	4.63	5.30	
22-May	5.37	5.70	5.50	87.54	88.19	80.58	5.04	4.69	5.50	
26-May	5.25	5.44	5.43	85.17	86.66	76.52	5.13	4.74	5.43	
27-May	5.15	5.30	5.23	76.65	83.12	66.24	5.18	4.78		
28-May	5.34	5.56	5.37	73.38	78.40	69.35	5.23	4.83		
29-May	5.27	5.40	5.27	69.40	73.15	64.76	5.27	4.87		
01-Jun	5.33	5.66	5.46	74.31	72.37	68.96	5.31	4.93		
02-Jun	5.37	5.69	5.56	77.99	73.90	70.92	5.36	4.98	5.56	
03-Jun	5.41	5.61	5.42	78.65	76.99	64.75	5.39	5.02		
04-Jun	5.58	5.61	5.59	81.49	79.38	68.35	5.43	5.07		
05-Jun	5.24	5.41	5.40	73.03	77.73	60.87	5.41	5.12		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	5.12	5.42	5.32	66.62	73.72	57.99	5.40	5.16		
09-Jun	5.19	5.54	5.34	54.98	64.88	58.52	5.41	5.20		
10-Jun	5.07	5.25	5.18	40.45	54.02	52.80	5.39	5.23		
11-Jun	4.82	5.03	5.02	31.14	42.19	47.77	5.37	5.25		
12-Jun	4.92	5.08	5.06	22.59	31.40	49.07	5.32	5.27		
15-Jun	4.99	5.13	5.05	25.58	26.44	48.74	5.26	5.27		
16-Jun	5.00	5.22	5.07	27.59	25.25	49.47	5.23	5.28		
17-Jun	4.84	5.02	4.96	23.75	25.64	45.63	5.16	5.27		
18-Jun	5.00	5.30	5.13	26.82	26.05	51.85	5.13	5.27		
19-Jun	5.18	5.24	5.18	31.03	27.20	53.53	5.11	5.28		
22-Jun	4.95	5.09	5.03	34.53	30.80	48.10	5.08	5.27		
23-Jun	4.70	4.94	4.86	28.51	31.36	42.80	5.04	5.23		
24-Jun	4.51	4.82	4.69	20.55	27.86	38.26	5.00	5.20		
25-Jun	4.47	4.66	4.56	14.49	21.18	35.19	4.95	5.17		
26-Jun	4.54	4.69	4.64	13.92	16.32	38.46	4.90	5.13		
29-Jun	4.48	4.67	4.52	10.11	12.84	35.56	4.84	5.10		
30-Jun	4.56	4.68	4.59	12.12	12.05	38.48	4.80	5.06		
01-Jul	4.53	4.65	4.63	13.25	11.83	40.15	4.74	5.01		
02-Jul	4.33	4.64	4.49	16.74	14.04	36.42	4.67	4.97		
06-Jul	4.59	4.76	4.69	24.30	18.10	44.36	4.63	4.92		
07-Jul	4.73	4.97	4.88	36.77	25.94	50.66	4.63	4.90		
08-Jul	4.67	4.94	4.74	45.36	35.48	46.48	4.64	4.87		
09-Jul	4.74	4.91	4.88	53.14	45.09	50.85	4.67	4.85		
10-Jul	4.73	4.87	4.75	52.66	50.38	47.01	4.69	4.83		
13-Jul	4.71	4.77	4.73	59.40	55.06	46.43	4.71	4.82		
14-Jul	4.68	4.73	4.73	60.09	57.38	46.43	4.72	4.80		
15-Jul	4.71	5.04	4.90	68.43	62.64	52.24	4.75	4.79		
16-Jul	4.91	4.99	4.98	78.11	68.88	54.73	4.81	4.79		
17-Jul	4.69	4.97	4.79	78.87	75.14	48.30	4.82	4.78		
20-Jul	4.59	4.67	4.59	64.32	73.77	42.62	4.79	4.75		
21-Jul	4.49	4.59	4.56	44.60	62.60	41.82	4.77	4.73		
22-Jul	4.64	4.84	4.67	38.97	49.30	45.81	4.74	4.71		
23-Jul	4.55	4.60	4.60	33.43	39.00	43.75	4.73	4.70		
24-Jul	4.30	4.46	4.42	28.03	33.48	38.92	4.69	4.68		
27-Jul	4.25	4.53	4.38	17.56	26.34	37.91	4.65	4.67		
28-Jul	4.17	4.31	4.18	11.27	18.96	33.29	4.57	4.65		
29-Jul	4.15	4.37	4.21	8.12	12.32	34.58	4.49	4.64		
30-Jul	4.32	4.54	4.35	10.12	9.84	40.37	4.44	4.63		
31-Jul	4.13	4.25	4.23	13.40	10.55	37.32	4.40	4.61		
03-Aug	4.20	4.43	4.38	20.31	14.61	43.10	4.38	4.60		
04-Aug	4.39	4.69	4.53	28.32	20.68	48.24	4.36	4.59		
05-Aug	4.46	4.66	4.57	42.12	30.25	49.55	4.36	4.58		
06-Aug	4.52	4.64	4.58	54.09	41.51	49.89	4.38	4.57		
07-Aug	4.61	4.71	4.71	65.82	54.01	54.23	4.42	4.56		
10-Aug	4.80	5.04	4.88	75.83	65.25	59.20	4.49	4.57		
11-Aug	4.69	4.93	4.73	76.68	72.78	53.66	4.55	4.57		
12-Aug	4.48	4.68	4.67	69.23	73.91	51.58	4.59	4.57		
13-Aug	4.70	4.91	4.81	66.67	70.86	55.88	4.65	4.56		
14-Aug	4.78	5.01	4.84	70.70	68.86	56.76	4.70	4.56		
17-Aug	4.80	4.97	4.88	78.39	71.92	57.97	4.74	4.56		
18-Aug	5.02	5.14	5.07	84.50	77.86	63.24	4.80	4.58		
19-Aug	4.95	5.16	5.03	87.62	83.50	61.49	4.85	4.61		
20-Aug	4.98	5.14	5.10	91.40	87.84	63.40	4.89	4.63		
21-Aug	4.90	5.06	4.93	83.75	87.59	56.13	4.90	4.64		
24-Aug	4.80	4.98	4.90	75.58	83.58	54.94	4.91	4.66		
25-Aug	5.08	5.28	5.10	70.16	76.50	60.92	4.96	4.70		
26-Aug	5.07	5.31	5.20	75.70	73.81	63.52	5.01	4.75		
27-Aug	4.97	5.27	5.14	81.26	75.71	60.90	5.04	4.79		
28-Aug	4.88	5.18	5.08	79.52	78.82	58.30	5.06	4.83		
31-Aug	5.05	5.26	5.22	80.32	80.36	62.34	5.08	4.87		
01-Sep	5.16	5.27	5.27	84.96	81.60	63.69	5.10	4.92		
02-Sep	5.15	5.29	5.24	89.80	85.03	62.24	5.12	4.95		
03-Sep	4.85	5.16	5.04	75.76	83.51	53.54	5.13	4.97		
04-Sep	4.79	5.07	4.89	51.03	72.20	48.11	5.13	4.99		
08-Sep	4.85	4.98	4.91	29.79	52.19	48.85	5.11	5.00		
09-Sep	4.71	4.84	4.73	15.21	32.01	42.88	5.06	4.99		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	4.54	4.88	4.72	16.60	20.53	42.57	5.01	4.99		
11-Sep	4.36	4.71	4.56	15.92	15.91	37.84	4.95	4.98		
14-Sep	4.24	4.53	4.44	21.04	17.85	34.72	4.87	4.97		
15-Sep	4.19	4.51	4.33	17.41	18.13	32.11	4.76	4.94		
16-Sep	4.30	4.64	4.48	19.19	19.21	38.86	4.68	4.92		
17-Sep	4.39	4.77	4.58	24.77	20.46	42.94	4.63	4.90		
18-Sep	4.35	4.55	4.41	27.27	23.74	38.27	4.57	4.87		
21-Sep	4.49	4.65	4.51	28.18	26.74	42.25	4.53	4.84		
22-Sep	4.55	4.72	4.63	29.70	28.38	46.69	4.52	4.83		
23-Sep	4.43	4.53	4.45	31.97	29.95	41.53	4.49	4.81		
24-Sep	4.16	4.51	4.32	28.13	29.93	38.24	4.46	4.77		
25-Sep	4.35	4.63	4.43	25.77	28.62	42.40	4.46	4.73		
28-Sep	4.31	4.40	4.34	25.17	26.36	40.03	4.46	4.69		
29-Sep	4.25	4.26	4.26	23.94	24.96	37.99	4.44	4.66		
30-Sep	4.12	4.22	4.17	15.53	21.55	35.79	4.39	4.61		
01-Oct	4.03	4.14	4.06	8.55	16.00	33.25	4.35	4.55		
02-Oct	4.11	4.18	4.13	8.42	10.83	36.34	4.31	4.49		
05-Oct	3.80	4.05	3.94	10.67	9.21	32.01	4.23	4.44		
06-Oct	3.75	3.88	3.76	9.64	9.58	28.53	4.16	4.39		3.76
07-Oct	3.71	3.87	3.78	7.45	9.25	29.45	4.10	4.33		3.78
08-Oct	3.63	3.92	3.78	7.22	8.10	29.45	4.02	4.29		3.78
09-Oct	3.63	3.76	3.75	10.57	8.41	28.81	3.96	4.24		3.75
12-Oct	3.69	3.87	3.81	14.26	10.68	32.00	3.91	4.21		
13-Oct	3.88	4.06	3.99	21.67	15.50	40.61	3.89	4.19		
14-Oct	3.87	4.09	4.04	31.67	22.53	42.78	3.89	4.17		
15-Oct	4.00	4.12	4.09	45.58	32.97	44.95	3.88	4.15		
16-Oct	4.04	4.20	4.19	63.21	46.82	49.09	3.91	4.14		
19-Oct	4.37	4.38	4.37	82.43	63.74	55.58	3.98	4.13		
20-Oct	4.17	4.39	4.37	94.97	80.21	55.58	4.04	4.13		
21-Oct	4.23	4.63	4.43	92.01	89.81	57.66	4.12	4.12		
22-Oct	4.53	4.68	4.53	87.69	91.56	60.95	4.20	4.12		
23-Oct	4.47	4.67	4.65	87.62	89.11	64.52	4.30	4.14		
26-Oct	4.62	4.74	4.63	90.98	88.77	63.48	4.37	4.15		
27-Oct	4.56	4.72	4.72	95.14	91.25	66.12	4.44	4.16		
28-Oct	4.44	4.73	4.57	90.99	92.37	58.52	4.50	4.18		
29-Oct	4.61	4.87	4.76	91.19	92.44	64.14	4.56	4.21		
30-Oct	4.77	4.81	4.77	88.45	90.21	64.42	4.60	4.24		
02-Nov	4.77	5.09	4.89	88.09	89.25	67.61	4.66	4.28		
03-Nov	4.69	4.95	4.88	84.78	87.11	67.07	4.71	4.32		
04-Nov	4.72	5.00	4.83	79.86	84.24	64.30	4.74	4.37		
05-Nov	4.76	4.90	4.87	77.35	80.66	65.53	4.77	4.42		
06-Nov	4.74	4.99	4.88	76.17	77.79	65.84	4.80	4.48		
09-Nov	4.85	5.12	4.95	78.05	77.19	68.05	4.82	4.53		
10-Nov	4.95	5.17	5.15	85.11	79.78	73.35	4.89	4.60	5.15	
11-Nov	4.97	5.23	5.10	87.23	83.47	70.21	4.92	4.65	5.10	
12-Nov	5.08	5.24	5.23	93.18	88.51	73.39	4.98	4.71	5.23	
13-Nov	5.16	5.37	5.21	88.36	89.59	72.12	5.01	4.76	5.21	
16-Nov	5.17	5.39	5.30	90.69	90.75	74.29	5.06	4.81	5.30	
17-Nov	4.93	5.24	5.13	80.00	86.35	64.14	5.09	4.85		
18-Nov	4.99	5.03	5.03	68.59	79.76	59.04	5.11	4.88		
19-Nov	4.89	5.08	5.02	54.13	67.57	58.54	5.12	4.91		
20-Nov	4.90	5.00	4.98	45.71	56.14	56.47	5.13	4.93		
23-Nov	4.70	4.96	4.82	35.32	45.05	49.01	5.09	4.94		
24-Nov	4.58	4.81	4.62	21.25	34.10	41.61	5.04	4.94		
25-Nov	4.42	4.49	4.42	7.44	21.34	35.79	4.95	4.92		
27-Nov	4.34	4.51	4.43	4.50	11.07	36.27	4.86	4.92		
30-Nov	4.45	4.48	4.45	6.35	6.10	37.28	4.77	4.90		
01-Dec	4.31	4.39	4.33	6.97	5.94	33.82	4.68	4.88		
02-Dec	4.22	4.36	4.31	6.67	6.66	33.27	4.60	4.85		
03-Dec	4.11	4.30	4.22	6.05	6.56	30.82	4.51	4.82		
04-Dec	4.14	4.20	4.17	6.99	6.57	29.52	4.42	4.79		4.17
07-Dec	4.28	4.46	4.37	12.10	8.38	40.35	4.37	4.77		
08-Dec	4.20	4.53	4.40	19.20	12.76	41.80	4.34	4.74		
09-Dec	4.05	4.41	4.21	22.81	18.04	35.87	4.32	4.71		
10-Dec	4.16	4.47	4.36	26.02	22.68	42.77	4.31	4.67		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
11-Dec	4.20	4.42	4.29	24.85	24.56	40.58	4.30	4.63		
14-Dec	4.05	4.28	4.23	27.56	26.14	38.74	4.28	4.59		

SAMPLE 4

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.64	2.85	2.81							
04-Dec	2.65	2.85	2.83							
05-Dec	2.75	2.91	2.91							
08-Dec	2.80	2.92	2.86							
09-Dec	2.65	2.91	2.84							
10-Dec	2.64	2.96	2.83							
11-Dec	2.90	3.08	2.91							
12-Dec	2.78	3.02	2.92							
15-Dec	3.01	3.01	3.01				2.88			
16-Dec	3.09	3.36	3.20				2.92			
17-Dec	3.26	3.27	3.27				2.97			
18-Dec	3.04	3.20	3.12				3.00			
19-Dec	3.18	3.37	3.26				3.04			
22-Dec	3.29	3.44	3.40				3.10			
23-Dec	3.31	3.47	3.31				3.16			
24-Dec	3.06	3.27	3.24	82.67		67.23	3.19			
26-Dec	3.24	3.52	3.41	80.17		71.60	3.25			
29-Dec	3.33	3.46	3.34	79.78	80.87	67.60	3.28			
30-Dec	3.07	3.29	3.20	76.89	78.95	60.34	3.28			
31-Dec	3.16	3.36	3.31	71.60	76.09	63.65	3.29			
02-Jan	3.24	3.27	3.25	66.26	71.58	60.68	3.30	3.11		
05-Jan	3.22	3.33	3.22	58.77	65.54	59.19	3.30	3.13		
06-Jan	2.98	3.27	3.08	41.07	55.37	52.70	3.26	3.14		
07-Jan	2.90	3.03	3.03	26.89	42.24	50.57	3.23	3.14		
08-Jan	2.81	3.10	3.00	22.08	30.01	49.29	3.20	3.15		
09-Jan	2.97	3.28	3.12	30.46	26.48	54.30	3.17	3.16		
12-Jan	3.15	3.40	3.21	42.25	31.60	57.68	3.16	3.18		
13-Jan	2.96	3.20	3.09	46.48	39.73	52.14	3.15	3.19		
14-Jan	2.96	3.28	3.09	45.07	44.60	52.14	3.12	3.20		
15-Jan	2.76	3.08	2.95	34.62	42.06	46.15	3.09	3.20		
16-Jan	2.94	3.23	3.14	39.57	39.76	53.89	3.08	3.19		
20-Jan	3.12	3.41	3.26	52.07	42.09	58.00	3.10	3.19		
21-Jan	3.16	3.18	3.16	64.25	51.96	53.71	3.11	3.19		
22-Jan	3.22	3.25	3.22	69.74	62.02	55.82	3.14	3.19		
23-Jan	3.16	3.28	3.21	67.18	67.06	55.37	3.15	3.18		
26-Jan	3.10	3.37	3.19	68.72	68.55	54.42	3.15	3.18		
27-Jan	3.13	3.22	3.17	66.15	67.35	53.42	3.15	3.17		
28-Jan	3.06	3.19	3.14	62.56	65.81	51.90	3.16	3.16		
29-Jan	3.07	3.21	3.08	56.92	61.88	48.89	3.17	3.15		
30-Jan	2.85	3.15	3.01	48.72	56.07	45.58	3.16	3.14		
02-Feb	2.98	3.31	3.15	49.23	51.62	52.51	3.15	3.13		
03-Feb	2.87	3.11	2.97	43.59	47.18	44.63	3.13	3.12		
04-Feb	2.69	3.02	2.86	38.64	43.82	40.62	3.09	3.10		
05-Feb	2.77	3.08	2.97	31.60	37.94	45.86	3.06	3.10		
06-Feb	2.92	3.13	3.12	40.74	36.99	52.07	3.05	3.10		
09-Feb	2.91	3.04	2.96	46.11	39.48	46.01	3.03	3.10		
10-Feb	2.80	2.94	2.94	45.40	44.08	45.30	3.01	3.09		
11-Feb	2.84	3.13	2.93	37.25	42.92	44.93	2.99	3.08		
12-Feb	3.01	3.04	3.04	41.18	41.28	49.83	2.99	3.07		
13-Feb	2.99	3.25	3.11	51.50	43.31	52.71	2.99	3.08		
17-Feb	2.76	3.06	2.92	52.10	48.26	45.13	2.98	3.07		
18-Feb	2.85	2.94	2.91	46.77	50.13	44.76	2.99	3.06		
19-Feb	2.85	3.15	2.96	38.71	45.86	47.07	2.99	3.05		
20-Feb	2.90	3.20	3.00	43.01	42.83	48.90	2.97	3.04		
23-Feb	2.78	3.03	2.90	43.68	41.80	44.73	2.97	3.03		
24-Feb	2.94	3.02	2.95	44.64	43.78	47.16	2.97	3.01		
25-Feb	2.73	3.13	2.93	40.80	43.04	46.28	2.97	3.00		
26-Feb	2.96	3.16	3.05	48.81	44.75	52.04	2.97	3.00		
27-Feb	2.86	2.93	2.88	42.95	44.18	44.72	2.94	2.98		
02-Mar	2.77	2.90	2.83	36.54	42.77	42.82	2.93	2.97		
03-Mar	2.57	2.88	2.70	22.40	33.96	38.25	2.91	2.96		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	2.54	2.61	2.57	14.19	24.38	34.31	2.87	2.93		
05-Mar	2.39	2.52	2.47	10.88	15.82	31.61	2.81	2.90		
06-Mar	2.34	2.45	2.39	6.45	10.51	29.61	2.75	2.88		2.39
09-Mar	2.31	2.32	2.31	5.04	7.46	27.71	2.68	2.85		2.31
10-Mar	2.02	2.35	2.20	7.02	6.17	25.32	2.60	2.81		2.20
11-Mar	2.31	2.41	2.32	13.56	8.54	32.21	2.52	2.78		
12-Mar	2.37	2.64	2.50	27.59	16.06	41.00	2.48	2.76		
13-Mar	2.27	2.39	2.31	30.99	24.05	35.73	2.42	2.73		
16-Mar	2.05	2.27	2.13	25.73	28.10	31.59	2.36	2.68		
17-Mar	1.98	2.26	2.16	16.78	24.50	32.98	2.31	2.64		
18-Mar	1.99	2.31	2.13	13.56	18.69	32.28	2.27	2.60		
19-Mar	1.85	2.07	1.95	13.52	14.62	28.34	2.22	2.55		1.95
20-Mar	1.78	1.96	1.84	10.26	12.45	26.24	2.17	2.50		1.84
23-Mar	1.96	2.05	1.96	11.97	11.92	32.16	2.14	2.45		
24-Mar	1.71	1.82	1.81	12.38	11.53	29.02	2.09	2.40		1.81
25-Mar	1.48	1.76	1.64	15.16	13.17	25.94	1.99	2.34		1.64
26-Mar	1.69	1.89	1.74	15.65	14.40	30.61	1.93	2.28		
27-Mar	1.80	1.99	1.83	22.13	17.65	34.61	1.90	2.22		
30-Mar	1.69	1.82	1.76	25.57	21.12	33.01	1.85	2.17		
31-Mar	1.56	1.76	1.74	25.57	24.43	32.55	1.81	2.12		
01-Apr	1.74	1.93	1.78	26.51	25.89	34.52	1.79	2.07		
02-Apr	1.73	1.98	1.80	31.31	27.80	35.54	1.78	2.04		
03-Apr	1.88	2.07	1.89	40.31	32.71	40.04	1.78	2.01		
06-Apr	1.58	1.76	1.75	40.16	37.26	35.85	1.77	1.98		
07-Apr	1.56	1.87	1.68	38.61	39.69	33.93	1.77	1.95		
08-Apr	1.72	1.89	1.73	36.27	38.35	36.54	1.77	1.93		
09-Apr	1.45	1.72	1.54	30.26	35.05	31.46	1.74	1.89		
13-Apr	1.44	1.63	1.50	22.14	29.56	30.50	1.71	1.84		
14-Apr	1.55	1.81	1.63	18.07	23.49	37.21	1.70	1.81		
15-Apr	1.58	1.77	1.70	26.98	22.40	40.54	1.69	1.79		
16-Apr	1.72	1.88	1.85	45.50	30.18	47.02	1.70	1.77		
17-Apr	1.83	2.18	2.01	61.13	44.54	52.92	1.71	1.77		
20-Apr	2.03	2.11	2.04	74.40	60.34	53.96	1.74	1.77		
21-Apr	2.00	2.13	2.07	81.08	72.20	55.02	1.79	1.78		
22-Apr	1.82	2.03	1.92	77.03	77.50	48.93	1.81	1.78		
23-Apr	2.07	2.31	2.11	75.67	77.93	55.63	1.87	1.80		
24-Apr	2.17	2.36	2.27	77.36	76.69	60.35	1.96	1.83		
27-Apr	2.21	2.43	2.37	87.06	80.03	63.00	2.04	1.86		
28-Apr	2.27	2.54	2.44	91.69	85.37	64.77	2.12	1.88		
29-Apr	2.11	2.37	2.28	87.07	88.61	57.93	2.17	1.91		
30-Apr	2.15	2.28	2.24	80.00	86.25	56.33	2.19	1.93		
01-May	1.88	2.06	2.06	66.87	77.98	49.68	2.20	1.95		
04-May	2.10	2.26	2.26	65.03	70.63	55.91	2.22	1.97		
05-May	2.28	2.34	2.34	65.99	65.96	58.14	2.26	1.99		
06-May	2.23	2.39	2.39	75.20	68.74	59.52	2.29	2.02		
07-May	2.15	2.48	2.28	72.89	71.36	55.21	2.30	2.05		
08-May	2.40	2.54	2.47	77.78	75.29	60.53	2.31	2.08		
11-May	2.47	2.72	2.54	78.06	76.24	62.31	2.32	2.13		
12-May	2.39	2.57	2.56	83.74	79.86	62.82	2.35	2.18		
13-May	2.24	2.48	2.40	74.29	78.69	56.21	2.37	2.22		
14-May	2.54	2.60	2.57	75.00	77.68	60.92	2.42	2.26		
15-May	2.66	2.96	2.76	75.18	74.82	65.39	2.48	2.30		
18-May	2.74	2.94	2.93	86.95	79.04	68.83	2.54	2.35		
19-May	3.02	3.02	3.02	92.90	85.01	70.50	2.61	2.39	3.02	
20-May	3.09	3.31	3.20	96.51	92.12	73.56	2.72	2.45	3.20	
21-May	3.30	3.44	3.32	94.45	94.62	75.39	2.81	2.51	3.32	
22-May	3.25	3.32	3.27	90.06	93.67	73.12	2.89	2.57	3.27	
26-May	3.12	3.50	3.31	87.93	90.81	73.80	2.98	2.62	3.31	
27-May	3.34	3.55	3.46	88.77	88.92	76.23	3.09	2.67	3.46	
28-May	3.41	3.63	3.45	88.85	88.52	75.72	3.19	2.72	3.45	
29-May	3.44	3.68	3.55	90.53	89.38	77.34	3.28	2.78	3.55	
01-Jun	3.33	3.68	3.50	88.51	89.30	74.66	3.34	2.84	3.50	
02-Jun	3.25	3.51	3.34	84.95	88.00	66.72	3.38	2.90		
03-Jun	3.42	3.55	3.44	80.95	84.80	68.95	3.40	2.96		
04-Jun	3.38	3.51	3.40	75.96	80.62	67.02	3.41	3.01		
05-Jun	3.19	3.35	3.32	71.07	75.99	63.21	3.42	3.05		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	3.24	3.44	3.39	63.44	70.16	65.08	3.43	3.10		
09-Jun	3.19	3.35	3.33	52.81	62.44	62.16	3.41	3.15		
10-Jun	3.37	3.56	3.37	47.13	54.46	63.34	3.40	3.19		
11-Jun	3.34	3.67	3.54	53.44	51.13	67.92	3.40	3.23		
12-Jun	3.70	3.77	3.74	71.68	57.41	72.30	3.43	3.30		
15-Jun	3.61	3.72	3.66	83.81	69.64	68.28	3.47	3.35		
16-Jun	3.35	3.66	3.46	74.32	76.60	59.40	3.47	3.38		
17-Jun	3.36	3.66	3.49	59.77	72.63	60.23	3.48	3.41		
18-Jun	3.35	3.61	3.51	51.15	61.75	60.81	3.50	3.43		
19-Jun	3.33	3.65	3.50	53.45	54.79	60.34	3.51	3.45		
22-Jun	3.63	3.71	3.65	62.64	55.75	64.77	3.55	3.46		
23-Jun	3.30	3.61	3.48	60.92	59.00	57.00	3.56	3.47		
24-Jun	3.41	3.58	3.49	60.34	61.30	57.32	3.55	3.48		
25-Jun	3.29	3.47	3.36	43.68	54.98	51.85	3.51	3.47		
26-Jun	3.06	3.18	3.16	31.71	45.24	44.76	3.46	3.46		
29-Jun	2.77	3.07	2.97	21.13	32.17	39.28	3.40	3.43		
30-Jun	2.81	3.05	2.98	18.36	23.73	39.69	3.34	3.41		
01-Jul	2.96	3.18	3.01	21.67	20.39	41.01	3.29	3.39		
02-Jul	3.09	3.36	3.17	29.04	23.02	47.58	3.25	3.38		
06-Jul	3.18	3.36	3.23	38.35	29.68	49.83	3.21	3.37		
07-Jul	3.26	3.38	3.36	51.27	39.55	54.41	3.19	3.37		
08-Jul	3.09	3.28	3.24	53.90	47.84	49.89	3.16	3.37		
09-Jul	2.85	3.21	3.05	47.52	50.90	43.69	3.13	3.35		
10-Jul	2.90	3.09	3.09	37.94	46.45	45.23	3.12	3.34		
13-Jul	2.87	3.04	2.98	29.61	38.36	41.84	3.12	3.31		
14-Jul	3.08	3.11	3.10	33.26	33.60	46.55	3.14	3.28		
15-Jul	2.88	3.04	2.92	29.06	30.64	41.16	3.13	3.25		
16-Jul	2.68	2.89	2.82	27.39	29.90	38.50	3.09	3.22		
17-Jul	2.76	2.98	2.95	26.67	27.70	43.61	3.06	3.19		
20-Jul	2.68	2.98	2.86	28.10	27.38	41.07	3.00	3.16		
21-Jul	2.68	2.88	2.76	25.24	26.67	38.39	2.95	3.13		
22-Jul	2.60	2.70	2.62	13.24	22.19	34.95	2.90	3.08		
23-Jul	2.51	2.79	2.62	8.88	15.78	34.95	2.85	3.04		
24-Jul	2.50	2.74	2.63	9.99	10.70	35.43	2.81	2.99		
27-Jul	2.69	2.76	2.69	17.26	12.04	38.36	2.76	2.96		
28-Jul	2.68	2.82	2.70	22.43	16.56	38.86	2.74	2.94		
29-Jul	2.49	2.61	2.55	20.74	20.14	34.37	2.71	2.92		
30-Jul	2.36	2.52	2.38	13.50	18.89	30.12	2.65	2.89		
31-Jul	2.12	2.30	2.29	9.84	14.69	28.14	2.58	2.86		2.29
03-Aug	2.14	2.45	2.29	12.77	12.04	28.14	2.53	2.82		2.29
04-Aug	2.17	2.43	2.25	16.92	13.18	27.21	2.49	2.77		2.25
05-Aug	2.16	2.38	2.36	20.50	16.73	33.66	2.46	2.72		
06-Aug	2.12	2.31	2.23	18.60	18.68	30.25	2.42	2.67		
07-Aug	2.04	2.15	2.11	16.34	18.48	27.48	2.35	2.63		2.11
10-Aug	1.80	2.13	1.97	12.60	15.85	24.65	2.27	2.58		1.97
11-Aug	1.72	1.81	1.79	10.45	13.13	21.57	2.19	2.52		1.79
12-Aug	1.59	1.77	1.68	10.12	11.06	19.93	2.11	2.45		1.68
13-Aug	1.49	1.70	1.68	9.32	9.96	19.93	2.04	2.39		1.68
14-Aug	1.73	1.88	1.82	15.47	11.64	28.00	1.99	2.34		1.82
17-Aug	1.79	1.95	1.89	24.94	16.58	31.71	1.95	2.29		
18-Aug	1.70	1.87	1.77	29.24	23.22	28.96	1.88	2.24		1.77
19-Aug	1.73	1.81	1.74	29.65	27.94	28.30	1.83	2.19		1.74
20-Aug	1.52	1.59	1.57	20.52	26.47	24.84	1.77	2.14		1.57
21-Aug	1.43	1.57	1.47	12.79	20.99	23.05	1.71	2.09		1.47
24-Aug	1.24	1.47	1.27	4.99	12.77	19.96	1.65	2.02		1.27
25-Aug	1.07	1.35	1.19	5.44	7.74	18.87	1.60	1.95		1.19
26-Aug	1.33	1.42	1.34	12.44	7.62	26.93	1.56	1.89		1.34
27-Aug	1.18	1.44	1.25	17.22	11.70	25.30	1.50	1.83		1.25
28-Aug	1.21	1.31	1.27	21.57	17.08	26.37	1.43	1.77		1.27
31-Aug	1.41	1.60	1.45	27.63	22.14	35.29	1.39	1.73		
01-Sep	1.53	1.72	1.53	39.39	29.53	38.84	1.37	1.70		
02-Sep	1.37	1.55	1.45	46.21	37.75	36.67	1.36	1.66		
03-Sep	1.52	1.71	1.55	50.00	45.20	41.09	1.37	1.62		
04-Sep	1.46	1.61	1.61	55.08	50.43	43.64	1.40	1.59		
08-Sep	1.64	1.79	1.76	71.76	58.95	49.51	1.47	1.57		
09-Sep	1.77	1.81	1.79	86.01	70.95	50.61	1.52	1.57		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	1.83	2.06	1.92	92.13	83.30	55.20	1.59	1.57		
11-Sep	1.70	1.90	1.85	87.31	88.49	52.38	1.66	1.58		
14-Sep	1.91	2.03	2.02	86.87	88.77	57.99	1.72	1.60		
15-Sep	2.09	2.27	2.22	90.05	88.08	63.45	1.80	1.61		
16-Sep	2.13	2.20	2.17	94.07	90.33	61.31	1.88	1.63		
17-Sep	2.07	2.40	2.23	90.65	91.59	62.93	1.95	1.65		
18-Sep	2.30	2.57	2.42	88.01	90.91	67.56	2.04	1.68		
21-Sep	2.17	2.37	2.22	81.35	86.67	59.18	2.09	1.71		
22-Sep	2.14	2.27	2.19	75.56	81.64	58.01	2.14	1.75		
23-Sep	1.98	2.23	2.14	66.81	74.57	56.04	2.16	1.79		
24-Sep	2.14	2.35	2.32	69.02	70.46	61.17	2.21	1.84		
25-Sep	2.08	2.29	2.13	63.81	66.55	54.01	2.23	1.88		
28-Sep	2.04	2.43	2.24	64.08	65.64	57.13	2.23	1.93		
29-Sep	2.19	2.31	2.20	57.41	61.77	55.65	2.23	1.97		
30-Sep	1.96	2.23	2.08	54.41	58.63	51.35	2.22	2.00		
01-Oct	2.02	2.29	2.09	42.81	51.54	51.68	2.18	2.03		
02-Oct	2.00	2.37	2.20	36.77	44.66	55.33	2.18	2.06		
05-Oct	2.17	2.28	2.20	35.32	38.30	55.33	2.18	2.10		
06-Oct	2.03	2.20	2.07	32.24	34.78	50.14	2.17	2.12		
07-Oct	1.87	2.07	2.01	25.79	31.12	47.91	2.14	2.13		
08-Oct	1.96	2.19	2.09	25.77	27.94	51.04	2.13	2.14		
09-Oct	1.87	2.15	1.96	25.12	25.56	46.18	2.10	2.15		
12-Oct	1.81	2.05	2.01	29.21	26.70	48.22	2.08	2.15		
13-Oct	2.06	2.24	2.09	31.16	28.50	51.40	2.08	2.16		
14-Oct	1.84	1.98	1.93	32.26	30.88	45.40	2.06	2.14		
15-Oct	1.98	2.25	2.13	38.71	34.04	52.81	2.05	2.14		
16-Oct	2.15	2.48	2.30	48.03	39.67	58.03	2.07	2.14		
19-Oct	2.07	2.27	2.18	59.99	48.91	53.53	2.08	2.13		
20-Oct	1.84	2.05	2.04	54.23	54.08	48.78	2.08	2.12		
21-Oct	1.80	2.00	2.00	39.65	51.29	47.48	2.07	2.11		
22-Oct	1.64	2.00	1.80	27.60	40.49	41.54	2.05	2.10		
23-Oct	1.77	1.94	1.90	26.47	31.24	45.23	2.04	2.08		
26-Oct	1.96	2.25	2.08	34.13	29.40	51.21	2.04	2.08		
27-Oct	1.87	2.13	2.02	42.86	34.48	49.28	2.05	2.07		
28-Oct	2.16	2.30	2.22	55.56	44.18	55.32	2.06	2.07		
29-Oct	2.21	2.33	2.28	63.49	53.97	56.98	2.06	2.08		
30-Oct	2.15	2.34	2.25	72.62	63.89	55.86	2.07	2.08		
02-Nov	2.23	2.41	2.31	76.19	70.77	57.65	2.10	2.09		
03-Nov	2.43	2.54	2.47	81.53	76.78	62.05	2.15	2.10		
04-Nov	2.44	2.75	2.63	87.06	81.59	65.88	2.24	2.13		
05-Nov	2.48	2.78	2.66	90.30	86.30	66.56	2.32	2.16		
06-Nov	2.68	2.78	2.74	91.72	89.69	68.37	2.40	2.19		
09-Nov	2.79	2.95	2.89	93.79	91.94	71.49	2.49	2.23	2.89	
10-Nov	2.60	2.75	2.74	91.96	92.49	64.63	2.55	2.27		
11-Nov	2.68	2.87	2.70	86.07	90.61	62.89	2.60	2.30		
12-Nov	2.50	2.66	2.57	75.87	84.63	57.49	2.63	2.33		
13-Nov	2.59	2.78	2.71	73.80	78.58	61.34	2.68	2.36		
16-Nov	2.54	2.74	2.69	70.03	73.23	60.50	2.70	2.38		
17-Nov	2.49	2.57	2.49	62.59	68.81	52.70	2.69	2.39		
18-Nov	2.26	2.54	2.40	47.08	59.90	49.61	2.66	2.41		
19-Nov	2.13	2.37	2.32	32.31	47.33	46.96	2.61	2.42		
20-Nov	2.31	2.62	2.45	31.15	36.85	51.49	2.56	2.45		
23-Nov	2.54	2.63	2.62	40.65	34.70	56.69	2.55	2.49		
24-Nov	2.63	2.85	2.81	60.57	44.12	61.64	2.56	2.52		
25-Nov	2.82	3.11	3.01	77.49	59.57	66.04	2.61	2.57		
27-Nov	2.69	3.02	2.84	81.72	73.26	59.76	2.63	2.60		
30-Nov	2.75	2.93	2.84	78.23	79.15	59.76	2.64	2.63		
01-Dec	2.73	3.02	2.85	72.79	77.58	60.02	2.68	2.65		
02-Dec	2.87	3.11	2.98	77.55	76.19	63.33	2.75	2.69		
03-Dec	3.08	3.27	3.11	82.06	77.47	66.33	2.83	2.72		
04-Dec	3.20	3.34	3.27	88.97	82.86	69.62	2.93	2.75		
07-Dec	3.29	3.49	3.41	91.43	87.49	72.18	3.01	2.78	3.41	
08-Dec	3.35	3.50	3.40	93.68	91.36	71.72	3.08	2.81	3.40	
09-Dec	3.35	3.49	3.44	94.15	93.09	72.48	3.13	2.84	3.44	
10-Dec	3.44	3.48	3.46	94.99	94.27	72.88	3.20	2.87	3.46	
11-Dec	3.39	3.64	3.50	93.18	94.10	73.69	3.27	2.91	3.50	
14-Dec	3.56	3.78	3.59	89.13	92.43	75.47	3.35	2.96	3.59	

SAMPLE 5

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	3.10	3.30	3.10							
04-Dec	2.81	2.99	2.98							
05-Dec	2.89	3.16	3.08							
08-Dec	2.97	3.22	3.02							
09-Dec	2.93	3.15	3.07							
10-Dec	2.98	3.13	3.04							
11-Dec	2.85	3.01	2.95							
12-Dec	2.73	2.94	2.86							
15-Dec	2.55	2.91	2.75				2.98			
16-Dec	2.49	2.87	2.67				2.94			
17-Dec	2.42	2.63	2.57				2.89			
18-Dec	2.45	2.68	2.64				2.84			
19-Dec	2.41	2.59	2.55				2.79			
22-Dec	2.24	2.56	2.38				2.71			
23-Dec	2.06	2.33	2.22				2.62			
24-Dec	1.98	2.25	2.09	11.96		16.54	2.53			
26-Dec	1.77	2.12	1.95	11.69		14.86	2.42			
29-Dec	1.61	1.90	1.77	10.56	11.40	13.02	2.32			
30-Dec	1.85	2.11	1.94	14.84	12.36	22.73	2.23			
31-Dec	1.69	1.94	1.74	13.80	13.06	19.91	2.14			
02-Jan	1.50	1.78	1.63	13.34	13.99	18.55	2.03	2.52		1.63
05-Jan	1.64	1.89	1.79	12.96	13.37	26.43	1.95	2.46		1.79
06-Jan	1.63	1.87	1.83	17.89	14.73	28.30	1.88	2.41		1.83
07-Jan	1.57	1.78	1.72	21.10	17.32	26.32	1.83	2.34		1.72
08-Jan	1.63	1.79	1.78	22.15	20.38	29.23	1.79	2.28		1.78
09-Jan	1.76	2.03	1.94	27.58	23.61	36.43	1.79	2.23		
12-Jan	1.82	2.01	1.86	32.69	27.47	34.54	1.80	2.17		
13-Jan	1.82	1.83	1.82	37.63	32.63	33.60	1.79	2.12		
14-Jan	1.95	2.11	2.01	46.84	39.05	41.71	1.82	2.08		
15-Jan	2.01	2.23	2.12	63.83	49.43	45.84	1.87	2.05		
16-Jan	2.31	2.39	2.32	81.69	64.12	52.43	1.93	2.03		
20-Jan	2.30	2.57	2.42	87.68	77.73	55.36	2.00	2.02		
21-Jan	2.21	2.38	2.22	81.80	83.72	48.88	2.05	2.00		
22-Jan	2.35	2.46	2.40	79.13	82.87	54.09	2.12	2.00		
23-Jan	2.16	2.43	2.23	72.47	77.80	49.01	2.16	1.99		
26-Jan	2.18	2.57	2.37	76.70	76.10	52.93	2.21	2.00		
27-Jan	2.20	2.51	2.32	73.67	74.28	51.41	2.27	2.01		
28-Jan	2.33	2.43	2.38	78.26	76.21	53.15	2.31	2.03		
29-Jan	2.15	2.37	2.26	72.17	74.70	49.35	2.32	2.05		
30-Jan	2.23	2.47	2.39	72.51	74.31	53.25	2.33	2.07		
02-Feb	2.32	2.54	2.39	71.24	71.97	53.25	2.33	2.10		
03-Feb	2.41	2.61	2.55	80.97	74.91	57.88	2.37	2.15		
04-Feb	2.42	2.55	2.52	83.97	78.73	56.74	2.38	2.18		
05-Feb	2.40	2.67	2.55	84.28	83.07	57.64	2.41	2.22		
06-Feb	2.22	2.47	2.42	71.28	79.84	52.57	2.42	2.25		
09-Feb	2.21	2.38	2.34	55.13	70.23	49.67	2.42	2.28		
10-Feb	2.16	2.31	2.27	37.18	54.53	47.22	2.41	2.29		
11-Feb	2.27	2.50	2.35	32.69	41.67	50.24	2.42	2.32		
12-Feb	2.09	2.25	2.15	23.96	31.28	43.53	2.39	2.33		
13-Feb	2.12	2.44	2.31	28.91	28.52	49.36	2.38	2.35		
17-Feb	2.28	2.46	2.31	28.74	27.20	49.36	2.36	2.36		
18-Feb	2.21	2.44	2.35	40.23	32.63	50.83	2.34	2.36		
19-Feb	2.31	2.60	2.48	50.00	39.66	55.37	2.33	2.36		
20-Feb	2.42	2.62	2.56	64.37	51.53	57.94	2.35	2.38		
23-Feb	2.55	2.76	2.58	73.80	62.72	58.59	2.37	2.38		
24-Feb	2.39	2.60	2.54	73.78	70.65	56.72	2.40	2.40		
25-Feb	2.34	2.47	2.36	60.20	69.26	49.13	2.40	2.40		
26-Feb	2.33	2.56	2.48	55.22	63.07	53.59	2.44	2.41		
27-Feb	2.61	2.70	2.68	62.19	59.20	59.90	2.48	2.42		
02-Mar	2.59	2.69	2.61	74.63	64.01	56.98	2.52	2.44		
03-Mar	2.41	2.71	2.59	80.10	72.31	56.13	2.54	2.45		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	2.39	2.54	2.42	67.16	73.96	49.45	2.54	2.45		
05-Mar	2.04	2.31	2.22	49.63	65.63	42.96	2.50	2.43		
06-Mar	2.07	2.37	2.27	35.40	50.73	44.91	2.46	2.42		
09-Mar	2.26	2.38	2.26	29.17	38.06	44.58	2.43	2.41		
10-Mar	2.09	2.28	2.21	28.70	31.09	42.90	2.42	2.40		
11-Mar	2.22	2.48	2.33	31.48	29.78	47.98	2.40	2.40		
12-Mar	2.25	2.56	2.42	38.89	33.02	51.46	2.37	2.40		
13-Mar	2.54	2.55	2.55	56.39	42.25	56.05	2.36	2.41		
16-Mar	2.54	2.68	2.66	73.81	56.36	59.53	2.37	2.44		
17-Mar	2.60	2.80	2.67	83.85	71.35	59.84	2.40	2.45		
18-Mar	2.68	2.78	2.76	90.06	82.57	62.63	2.46	2.48		
19-Mar	2.55	2.73	2.63	85.09	86.33	56.52	2.50	2.49		
20-Mar	2.53	2.72	2.53	78.95	84.70	52.30	2.53	2.49		
23-Mar	2.57	2.79	2.62	72.81	78.95	55.52	2.57	2.49		
24-Mar	2.53	2.77	2.70	75.88	75.88	58.22	2.62	2.50		
25-Mar	2.65	2.73	2.68	82.24	76.97	57.29	2.64	2.51		
26-Mar	2.37	2.63	2.53	77.46	78.53	50.70	2.64	2.52		
27-Mar	2.46	2.82	2.64	73.63	77.77	54.80	2.64	2.52		
30-Mar	2.59	2.77	2.77	76.33	75.80	59.13	2.65	2.53		
31-Mar	2.53	2.79	2.71	82.57	77.51	56.45	2.65	2.53		
01-Apr	2.70	2.85	2.72	81.76	80.22	56.80	2.66	2.54		
02-Apr	2.51	2.66	2.58	65.79	76.71	50.62	2.66	2.55		
03-Apr	2.40	2.56	2.48	46.53	64.69	46.72	2.65	2.56		
06-Apr	2.51	2.66	2.59	37.50	49.94	51.18	2.63	2.57		
07-Apr	2.56	2.86	2.74	48.09	44.04	56.53	2.64	2.60		
08-Apr	2.78	3.01	2.93	69.61	51.73	62.18	2.68	2.63		
09-Apr	2.59	2.83	2.78	75.69	64.46	55.99	2.70	2.65		
13-Apr	2.83	2.95	2.95	80.73	75.34	60.76	2.72	2.68		
14-Apr	2.84	3.17	3.00	77.81	78.08	62.06	2.75	2.70		
15-Apr	3.01	3.18	3.11	86.91	81.82	64.82	2.80	2.72		
16-Apr	3.30	3.42	3.30	86.11	83.61	69.02	2.88	2.75		
17-Apr	3.44	3.57	3.48	90.63	87.89	72.38	2.99	2.78	3.48	
20-Apr	3.17	3.38	3.35	87.25	88.00	66.75	3.07	2.82	0.00	
21-Apr	3.36	3.55	3.52	89.74	89.21	70.03	3.16	2.87	3.52	
22-Apr	3.62	3.67	3.65	91.78	89.59	72.29	3.24	2.91	3.65	
23-Apr	3.47	3.69	3.60	95.72	92.42	70.10	3.33	2.96	3.60	
24-Apr	3.45	3.66	3.48	91.22	92.91	65.02	3.39	3.00		
27-Apr	3.54	3.67	3.56	87.91	91.62	66.75	3.45	3.04		
28-Apr	3.66	3.93	3.74	85.51	88.21	70.31	3.52	3.10	3.74	
29-Apr	3.86	3.96	3.92	90.47	87.96	73.38	3.59	3.15	3.92	
30-Apr	3.80	3.90	3.88	91.94	89.30	71.61	3.63	3.21	3.88	
01-May	3.86	4.07	3.91	92.33	91.58	72.15	3.70	3.26	3.91	
04-May	3.85	3.93	3.89	87.64	90.64	71.17	3.74	3.33	3.89	
05-May	3.85	4.01	3.95	85.56	88.51	72.38	3.77	3.40	3.95	
06-May	3.85	3.88	3.85	81.75	84.98	67.32	3.80	3.46		
07-May	3.94	4.16	4.05	83.70	83.67	71.60	3.86	3.52	4.05	
08-May	3.81	4.07	3.92	78.15	81.20	65.59	3.90	3.57		
11-May	3.66	3.87	3.76	67.52	76.46	59.02	3.90	3.61		
12-May	3.80	3.90	3.81	54.79	66.82	60.35	3.89	3.65		
13-May	3.77	3.89	3.79	47.42	56.57	59.52	3.88	3.69		
14-May	3.51	3.63	3.61	37.99	46.73	52.47	3.85	3.72		
15-May	3.38	3.63	3.49	25.79	37.07	48.36	3.80	3.72		
18-May	3.64	3.72	3.69	23.08	28.95	54.73	3.77	3.73		
19-May	3.77	3.91	3.88	39.32	29.39	59.80	3.78	3.76		
20-May	3.87	3.95	3.94	58.55	40.31	61.27	3.77	3.78		
21-May	3.66	3.75	3.75	61.11	52.99	54.46	3.75	3.78		
22-May	3.70	3.99	3.87	60.68	60.11	57.66	3.76	3.80		
26-May	3.64	3.92	3.74	52.14	57.98	53.29	3.75	3.81		
27-May	3.60	3.67	3.67	48.72	53.85	51.05	3.74	3.81		
28-May	3.77	3.99	3.82	49.03	49.96	55.38	3.76	3.82		
29-May	3.57	3.66	3.63	47.31	48.35	49.41	3.78	3.80		
01-Jun	3.52	3.86	3.67	50.76	49.04	50.62	3.77	3.79		
02-Jun	3.63	3.88	3.82	53.55	50.54	54.96	3.77	3.79		
03-Jun	3.62	3.71	3.64	54.10	52.80	49.35	3.73	3.78		
04-Jun	3.39	3.69	3.56	48.09	51.91	47.06	3.71	3.76		
05-Jun	3.65	3.88	3.74	43.49	48.56	52.42	3.70	3.75		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	3.77	3.97	3.86	55.39	48.99	55.65	3.71	3.75		
09-Jun	3.61	3.89	3.75	65.56	54.81	52.16	3.72	3.74		
10-Jun	3.47	3.64	3.63	59.44	60.13	48.58	3.70	3.73		
11-Jun	3.55	3.89	3.70	50.56	58.52	50.70	3.71	3.73		
12-Jun	3.55	3.75	3.69	47.22	52.41	50.38	3.71	3.72		
15-Jun	3.60	3.72	3.68	50.00	49.26	50.04	3.69	3.72		
16-Jun	3.57	3.81	3.74	52.22	49.81	52.13	3.71	3.74		
17-Jun	3.90	4.02	3.91	63.07	55.10	57.55	3.74	3.75		
18-Jun	3.66	3.87	3.74	65.48	60.26	51.30	3.74	3.74		
19-Jun	3.70	3.84	3.81	68.25	65.60	53.54	3.74	3.73		
22-Jun	3.66	4.02	3.82	63.49	65.74	53.86	3.75	3.74		
23-Jun	3.62	3.67	3.63	57.67	63.14	47.09	3.75	3.73		
24-Jun	3.52	3.57	3.52	38.48	53.21	43.67	3.73	3.72		
25-Jun	3.55	3.69	3.67	27.85	41.33	49.10	3.72	3.72		
26-Jun	3.47	3.54	3.53	18.79	28.37	44.76	3.71	3.70		
29-Jun	3.39	3.68	3.51	22.11	22.91	44.16	3.68	3.70		
30-Jun	3.16	3.39	3.34	16.96	19.29	39.33	3.62	3.68		
01-Jul	3.29	3.43	3.33	19.92	19.66	39.06	3.57	3.66		
02-Jul	3.03	3.22	3.13	16.93	17.94	34.02	3.50	3.63		
06-Jul	2.91	3.14	2.98	12.06	16.30	30.81	3.40	3.61		
07-Jul	2.75	3.05	2.91	9.67	12.89	29.42	3.32	3.57		2.91
08-Jul	2.87	3.13	2.94	11.29	11.01	30.86	3.26	3.52		
09-Jul	2.75	2.92	2.91	13.39	11.45	30.20	3.18	3.48		
10-Jul	2.70	2.94	2.82	12.22	12.30	28.23	3.10	3.44		2.82
13-Jul	2.64	2.76	2.76	11.04	12.21	26.97	3.01	3.40		2.76
14-Jul	2.72	2.91	2.76	10.65	11.30	26.97	2.95	3.35		2.76
15-Jul	2.69	2.92	2.86	14.60	12.10	32.77	2.90	3.32		
16-Jul	2.89	3.03	2.92	19.77	15.01	36.06	2.87	3.28		
17-Jul	2.86	3.10	3.06	29.42	21.26	43.05	2.88	3.24		
20-Jul	2.81	2.93	2.92	34.25	27.81	38.52	2.88	3.20		
21-Jul	2.87	2.97	2.96	38.78	34.15	40.45	2.89	3.16		
22-Jul	2.73	3.00	2.90	40.26	37.76	38.49	2.88	3.11		
23-Jul	3.08	3.20	3.09	55.23	44.76	47.19	2.91	3.09		
24-Jul	2.98	3.26	3.10	66.46	53.98	47.61	2.95	3.07		
27-Jul	2.92	3.29	3.12	76.13	65.94	48.49	2.99	3.04		
28-Jul	3.05	3.31	3.12	73.23	71.94	48.49	3.02	3.02		
29-Jul	2.82	3.19	3.02	67.40	72.25	44.18	3.03	3.00		
30-Jul	2.89	3.14	3.02	61.69	67.44	44.18	3.03	2.98		
31-Jul	2.98	3.19	3.11	60.39	63.16	48.92	3.05	2.97		
03-Aug	2.75	2.98	2.93	54.39	58.82	41.35	3.05	2.96		
04-Aug	2.73	2.79	2.79	38.93	51.24	36.61	3.03	2.95		
05-Aug	2.66	2.87	2.69	17.89	37.07	33.64	2.99	2.94		
06-Aug	2.36	2.56	2.55	11.65	22.83	29.98	2.93	2.92		
07-Aug	2.63	2.90	2.71	20.49	16.68	38.26	2.88	2.91		
10-Aug	2.67	2.99	2.85	36.14	22.76	44.44	2.85	2.92		
11-Aug	2.95	3.06	2.96	50.53	35.72	48.79	2.85	2.93		
12-Aug	3.03	3.07	3.05	62.46	49.71	52.09	2.85	2.94		
13-Aug	2.83	2.94	2.94	65.61	59.53	48.01	2.83	2.94		
14-Aug	2.92	3.07	2.92	64.21	64.09	47.29	2.83	2.94		
17-Aug	3.06	3.17	3.08	68.92	66.25	53.35	2.86	2.94		
18-Aug	2.87	3.00	2.96	72.66	68.60	48.82	2.89	2.95		
19-Aug	2.99	3.24	3.14	82.56	74.71	54.99	2.96	2.95		
20-Aug	2.90	3.17	2.98	77.13	77.45	49.30	2.99	2.96		
21-Aug	2.86	2.92	2.90	73.48	77.72	46.69	2.99	2.95		
24-Aug	2.81	3.07	2.89	64.02	71.54	46.37	2.98	2.94		
25-Aug	2.65	2.86	2.85	59.09	65.53	45.00	2.96	2.93		
26-Aug	2.89	3.01	2.98	57.76	60.29	50.15	2.97	2.92		
27-Aug	2.69	3.00	2.82	47.29	54.71	44.61	2.96	2.91		
28-Aug	2.58	2.85	2.72	35.80	46.95	41.52	2.92	2.90		
31-Aug	2.62	2.81	2.68	21.73	34.94	40.32	2.88	2.88		
01-Sep	2.64	2.73	2.71	18.69	25.40	41.69	2.84	2.87		
02-Sep	2.72	2.91	2.91	28.28	22.90	49.90	2.83	2.87		
03-Sep	2.87	3.13	2.94	41.41	29.46	51.01	2.83	2.88		
04-Sep	3.04	3.22	3.08	60.10	43.27	55.94	2.85	2.91		
08-Sep	3.04	3.22	3.09	69.19	56.90	56.28	2.88	2.93		
09-Sep	3.01	3.37	3.21	77.59	68.96	60.23	2.91	2.94		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	2.98	3.19	3.18	77.66	74.81	58.80	2.95	2.95		
11-Sep	2.97	3.24	3.17	76.79	77.35	58.30	3.00	2.96		
14-Sep	3.12	3.39	3.31	80.25	78.23	63.01	3.07	2.98		
15-Sep	3.12	3.47	3.31	82.28	79.77	63.01	3.13	3.00		
16-Sep	3.43	3.56	3.48	87.99	83.51	68.08	3.20	3.01		
17-Sep	3.41	3.57	3.41	85.90	85.39	64.18	3.25	3.04		
18-Sep	3.11	3.41	3.28	81.72	85.20	57.58	3.27	3.04		
21-Sep	3.29	3.57	3.47	80.85	82.82	63.49	3.31	3.07		
22-Sep	3.40	3.68	3.60	83.46	82.01	66.89	3.36	3.10		
23-Sep	3.69	3.96	3.77	87.83	84.05	70.73	3.42	3.14	3.77	
24-Sep	3.80	4.10	3.93	86.40	85.90	73.81	3.51	3.19	3.93	
25-Sep	3.87	4.02	3.88	82.69	85.64	71.28	3.57	3.24	3.88	
28-Sep	3.90	4.07	3.92	83.19	84.09	72.11	3.64	3.29	3.92	
29-Sep	3.94	4.02	4.00	85.25	83.71	73.73	3.70	3.35	4.00	
30-Sep	3.71	3.85	3.81	83.19	83.87	64.20	3.74	3.40		
01-Oct	3.75	3.85	3.78	77.72	82.05	62.81	3.80	3.45		
02-Oct	3.57	3.65	3.59	63.50	74.80	54.78	3.81	3.49		
05-Oct	3.40	3.64	3.44	49.83	63.68	49.41	3.79	3.51		
06-Oct	3.28	3.54	3.41	37.37	50.23	48.38	3.75	3.53		
07-Oct	3.21	3.43	3.34	28.96	38.72	45.99	3.69	3.54		
08-Oct	3.30	3.53	3.43	26.08	30.80	49.45	3.64	3.55		
09-Oct	3.24	3.42	3.38	22.35	25.80	47.63	3.58	3.56		
12-Oct	3.15	3.35	3.21	16.71	21.72	41.96	3.49	3.56		
13-Oct	2.83	3.08	3.03	13.72	17.59	36.94	3.40	3.55		
14-Oct	2.88	3.10	3.05	13.27	14.57	37.83	3.32	3.53		
15-Oct	2.96	2.96	2.96	14.66	13.88	35.41	3.25	3.51		
16-Oct	3.00	3.17	3.00	14.17	14.03	37.33	3.20	3.49		
19-Oct	2.80	2.91	2.84	9.53	12.78	33.09	3.14	3.47		
20-Oct	2.72	2.88	2.88	10.75	11.48	35.08	3.09	3.44		
21-Oct	2.85	3.12	2.96	14.59	11.62	38.97	3.03	3.41		
22-Oct	2.95	3.21	3.11	27.45	17.60	45.57	3.00	3.38		
23-Oct	2.92	3.08	2.99	33.71	25.25	41.69	2.98	3.33		
26-Oct	2.82	3.18	3.01	37.04	32.73	42.56	2.98	3.29		
27-Oct	3.18	3.25	3.20	42.66	37.80	50.23	2.99	3.26		
28-Oct	3.14	3.47	3.27	56.13	45.28	52.73	3.03	3.22		
29-Oct	3.26	3.38	3.27	68.64	55.81	52.73	3.06	3.20		
30-Oct	3.12	3.31	3.19	69.78	64.85	49.44	3.10	3.17		
02-Nov	3.01	3.26	3.15	64.44	67.62	47.83	3.13	3.15		
03-Nov	3.04	3.32	3.14	58.67	64.30	47.41	3.15	3.13		
04-Nov	2.90	3.01	2.95	48.00	57.04	40.26	3.13	3.11		
05-Nov	2.81	3.12	3.00	41.33	49.33	42.71	3.13	3.10		
06-Nov	2.79	3.06	2.94	32.44	40.59	40.56	3.12	3.07		
09-Nov	2.73	2.77	2.74	22.67	32.15	34.35	3.07	3.04		
10-Nov	2.61	2.88	2.76	16.04	23.72	35.41	3.02	3.02		
11-Nov	2.67	2.81	2.81	14.02	17.58	38.12	2.96	3.01		
12-Nov	2.86	3.01	2.98	27.91	19.32	46.34	2.94	3.01		
13-Nov	3.01	3.29	3.13	42.25	28.06	52.35	2.94	3.02		
16-Nov	3.28	3.50	3.31	60.71	43.62	58.38	2.96	3.03		
17-Nov	3.27	3.53	3.39	74.63	59.20	60.76	3.01	3.06		
18-Nov	3.23	3.46	3.40	83.10	72.82	61.05	3.05	3.08		
19-Nov	3.40	3.50	3.45	87.32	81.68	62.59	3.11	3.10		
20-Nov	3.10	3.31	3.29	83.70	84.71	55.10	3.17	3.11		
23-Nov	3.08	3.18	3.18	75.72	82.25	50.62	3.22	3.12		
24-Nov	3.20	3.35	3.28	69.57	76.33	54.26	3.27	3.13		
25-Nov	3.22	3.33	3.31	70.29	71.86	55.33	3.30	3.14		
27-Nov	3.40	3.60	3.46	78.26	72.70	60.30	3.34	3.15		
30-Nov	3.39	3.59	3.41	80.92	76.49	57.98	3.35	3.16		
01-Dec	3.21	3.29	3.24	75.99	78.39	50.83	3.34	3.16		
02-Dec	3.14	3.30	3.25	64.93	73.95	51.21	3.32	3.16		
03-Dec	3.03	3.27	3.07	41.39	60.77	44.51	3.28	3.16		
04-Dec	2.78	2.95	2.92	26.65	44.32	39.84	3.24	3.16		
07-Dec	2.69	3.06	2.88	16.04	28.03	38.67	3.20	3.15		
08-Dec	3.01	3.11	3.02	24.74	22.48	44.77	3.17	3.16		
09-Dec	2.66	2.90	2.83	25.08	21.95	39.09	3.12	3.16		
10-Dec	2.66	2.88	2.69	19.18	23.00	35.51	3.03	3.16		
11-Dec	2.61	2.88	2.71	10.46	18.24	36.41	2.96	3.15		
14-Dec	2.52	2.85	2.66	8.75	12.80	35.10	2.89	3.14		

SAMPLE 6

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.92	3.00	2.98							
04-Dec	2.94	3.15	3.05							
05-Dec	3.21	3.25	3.23							
08-Dec	3.25	3.49	3.32							
09-Dec	3.47	3.57	3.52							
10-Dec	3.31	3.58	3.40							
11-Dec	3.29	3.57	3.43							
12-Dec	3.53	3.55	3.53							
15-Dec	3.30	3.54	3.48				3.33			
16-Dec	3.23	3.45	3.36				3.37			
17-Dec	3.15	3.29	3.23				3.39			
18-Dec	3.35	3.37	3.37				3.40			
19-Dec	3.41	3.64	3.47				3.42			
22-Dec	3.42	3.54	3.46				3.41			
23-Dec	3.44	3.70	3.52				3.43			
24-Dec	3.54	3.71	3.57	75.44		68.84	3.44			
26-Dec	3.56	3.76	3.58	73.94		69.08	3.45			
29-Dec	3.29	3.43	3.40	62.16	70.51	60.07	3.44			
30-Dec	3.09	3.36	3.29	47.11	61.07	55.31	3.43			
31-Dec	3.02	3.17	3.12	28.12	45.79	48.88	3.42			
02-Jan	2.93	3.26	3.09	20.88	32.04	47.82	3.39	3.35		
05-Jan	3.14	3.19	3.18	20.97	23.32	51.23	3.36	3.36		
06-Jan	3.11	3.27	3.26	29.72	23.86	54.10	3.33	3.37		
07-Jan	3.17	3.24	3.21	34.54	28.41	52.04	3.30	3.37		
08-Jan	3.29	3.40	3.33	40.56	34.94	56.34	3.27	3.37		
09-Jan	3.21	3.47	3.34	43.78	39.63	56.69	3.25	3.36		
12-Jan	3.21	3.35	3.26	45.78	43.37	53.04	3.23	3.36		
13-Jan	3.03	3.23	3.18	39.76	43.11	49.60	3.22	3.34		
14-Jan	3.23	3.44	3.35	40.16	41.90	56.11	3.24	3.34		
15-Jan	3.17	3.46	3.35	43.78	41.23	56.11	3.27	3.33		
16-Jan	3.33	3.57	3.38	57.17	47.04	57.24	3.30	3.33		
20-Jan	3.26	3.46	3.32	60.62	53.86	54.23	3.30	3.33		
21-Jan	3.39	3.55	3.47	71.88	63.22	59.91	3.33	3.34		
22-Jan	3.46	3.52	3.52	79.17	70.55	61.61	3.35	3.34		
23-Jan	3.65	3.73	3.68	89.81	80.28	66.53	3.39	3.35		
26-Jan	3.34	3.60	3.48	83.11	84.03	56.75	3.41	3.35		
27-Jan	3.49	3.52	3.50	74.76	82.56	57.42	3.45	3.35		
28-Jan	3.48	3.61	3.51	66.67	74.85	57.78	3.47	3.34		
29-Jan	3.37	3.51	3.41	63.33	68.25	53.03	3.47	3.34		
30-Jan	3.23	3.47	3.41	59.05	63.02	53.03	3.48	3.35		
02-Feb	3.48	3.66	3.55	60.95	61.11	58.56	3.50	3.37		
03-Feb	3.44	3.52	3.51	63.10	61.03	56.51	3.51	3.39		
04-Feb	3.44	3.68	3.48	63.45	62.50	54.96	3.50	3.40		
05-Feb	3.48	3.67	3.64	66.02	64.19	61.10	3.50	3.42		
06-Feb	3.32	3.63	3.51	64.45	64.64	54.59	3.50	3.44		
09-Feb	3.22	3.42	3.34	53.84	61.44	47.46	3.48	3.44		
10-Feb	3.28	3.58	3.45	41.54	53.28	51.84	3.48	3.44		
11-Feb	3.36	3.39	3.38	33.33	42.91	49.04	3.47	3.45		
12-Feb	3.25	3.54	3.36	35.64	36.84	48.24	3.47	3.46		
13-Feb	3.30	3.50	3.43	35.82	34.93	51.25	3.46	3.46		
17-Feb	3.26	3.55	3.42	39.86	37.10	50.79	3.45	3.46		
18-Feb	3.12	3.36	3.29	39.83	38.50	45.19	3.42	3.46		
19-Feb	2.96	3.23	3.12	32.02	37.23	39.12	3.37	3.45		
20-Feb	3.05	3.40	3.21	29.10	33.65	43.45	3.33	3.44		
23-Feb	2.95	3.14	3.05	23.55	28.22	38.24	3.30	3.42		
24-Feb	3.03	3.31	3.13	24.36	25.67	41.99	3.27	3.39		
25-Feb	3.20	3.34	3.31	29.45	25.79	49.42	3.26	3.38		
26-Feb	3.12	3.36	3.26	40.08	31.30	47.60	3.25	3.37		
27-Feb	3.11	3.24	3.21	45.62	38.38	45.78	3.22	3.36		
02-Mar	2.91	3.04	3.03	34.92	40.21	39.87	3.18	3.34		
03-Mar	2.83	3.07	3.02	28.52	36.36	39.56	3.15	3.32		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	2.94	3.01	2.99	22.17	28.54	38.60	3.13	3.29		
05-Mar	3.07	3.28	3.14	30.56	27.08	45.67	3.13	3.27		
06-Mar	2.80	3.10	2.96	28.87	27.20	39.76	3.12	3.25		
09-Mar	2.94	3.01	3.00	32.57	30.67	41.57	3.10	3.22		
10-Mar	2.70	2.90	2.87	26.32	29.25	37.61	3.05	3.19		
11-Mar	2.81	3.13	2.96	31.59	30.16	41.75	3.02	3.17		
12-Mar	3.09	3.32	3.16	43.71	33.87	49.72	3.01	3.16		
13-Mar	3.05	3.27	3.15	58.34	44.55	49.36	3.03	3.15		
16-Mar	3.05	3.26	3.07	64.65	55.57	46.43	3.03	3.13		
17-Mar	2.68	3.02	2.87	50.73	57.90	40.04	3.02	3.11		
18-Mar	2.68	2.92	2.86	37.38	50.92	39.74	2.99	3.08		
19-Mar	2.75	2.92	2.79	24.42	37.51	37.65	2.97	3.06		
20-Mar	2.74	2.95	2.76	19.27	27.02	36.76	2.94	3.04		
23-Mar	2.62	2.76	2.72	14.66	19.45	35.55	2.93	3.01		
24-Mar	2.64	2.78	2.76	15.60	16.51	37.76	2.90	3.00		
25-Mar	2.90	3.10	2.91	25.24	18.50	45.31	2.88	2.99		
26-Mar	3.03	3.10	3.10	43.33	28.06	53.08	2.87	2.98		
27-Mar	3.08	3.32	3.23	65.71	44.76	57.53	2.89	2.98		
30-Mar	3.27	3.31	3.31	84.76	64.60	60.04	2.94	2.98		
31-Mar	3.26	3.47	3.43	93.67	81.38	63.52	3.00	3.00		
01-Apr	3.30	3.51	3.47	96.46	91.63	64.63	3.08	3.02		
02-Apr	3.28	3.64	3.48	91.70	93.94	64.91	3.16	3.05		
03-Apr	3.35	3.58	3.46	87.39	91.85	63.80	3.24	3.06		
06-Apr	3.20	3.36	3.35	79.41	86.17	57.92	3.30	3.08		
07-Apr	3.08	3.43	3.24	71.57	79.46	52.69	3.34	3.09		
08-Apr	3.28	3.50	3.40	69.61	73.53	58.55	3.37	3.12		
09-Apr	3.54	3.61	3.60	77.78	72.98	64.48	3.42	3.15		
13-Apr	3.65	3.77	3.72	89.37	78.92	67.48	3.46	3.18		
14-Apr	3.41	3.71	3.53	88.02	85.06	58.98	3.47	3.19		
15-Apr	3.49	3.55	3.53	78.52	85.31	58.98	3.48	3.22		
16-Apr	3.54	3.57	3.56	69.85	78.80	59.90	3.49	3.25		
17-Apr	3.22	3.49	3.38	60.20	69.52	52.28	3.48	3.27		
20-Apr	3.16	3.39	3.25	45.89	58.65	47.57	3.47	3.29		
21-Apr	3.41	3.61	3.42	39.13	48.41	53.47	3.49	3.33		
22-Apr	3.20	3.40	3.30	35.27	40.10	49.26	3.48	3.35		
23-Apr	3.21	3.35	3.26	35.75	36.71	47.90	3.44	3.38		
24-Apr	3.27	3.56	3.36	32.85	34.62	51.50	3.40	3.40		
27-Apr	3.30	3.45	3.43	39.13	35.91	53.89	3.39	3.41		
28-Apr	3.44	3.66	3.56	52.29	41.42	58.04	3.39	3.43		
29-Apr	3.23	3.46	3.43	53.52	48.31	52.91	3.38	3.44		
30-Apr	3.33	3.59	3.44	51.91	52.58	53.26	3.38	3.44		
01-May	3.44	3.55	3.44	47.02	50.82	53.26	3.40	3.44		
04-May	3.43	3.57	3.51	55.60	51.51	55.86	3.41	3.44		
05-May	3.62	3.82	3.71	68.08	56.90	62.32	3.46	3.45		
06-May	3.78	4.05	3.87	77.70	67.13	66.53	3.53	3.47		
07-May	3.65	4.03	3.85	80.21	75.33	65.54	3.58	3.50		
08-May	3.60	3.84	3.66	70.47	76.13	56.91	3.61	3.51		
11-May	3.56	3.89	3.75	65.45	72.05	59.62	3.63	3.52		
12-May	3.73	3.98	3.83	64.21	66.71	61.92	3.67	3.53		
13-May	3.58	3.81	3.74	66.90	65.52	57.93	3.71	3.54		
14-May	3.58	3.78	3.59	59.97	63.69	51.92	3.72	3.54		
15-May	3.51	3.71	3.64	52.03	59.64	53.64	3.74	3.54		
18-May	3.52	3.82	3.67	49.19	53.73	54.69	3.73	3.56		
19-May	3.66	3.93	3.81	56.78	52.66	59.33	3.73	3.58		
20-May	3.55	3.67	3.65	51.94	52.63	52.69	3.70	3.60		
21-May	3.54	3.73	3.55	40.50	49.74	49.01	3.69	3.61		
22-May	3.28	3.61	3.46	26.07	39.50	45.89	3.66	3.62		
26-May	3.42	3.74	3.62	28.96	31.85	51.76	3.64	3.63		
27-May	3.56	3.77	3.74	42.96	32.66	55.65	3.64	3.64		
28-May	3.39	3.63	3.56	48.50	40.14	49.24	3.63	3.64		
29-May	3.51	3.78	3.71	54.25	48.57	53.99	3.64	3.66		
01-Jun	3.42	3.65	3.56	47.14	49.96	49.05	3.63	3.66		
02-Jun	3.31	3.64	3.48	44.07	48.49	46.60	3.59	3.66		
03-Jun	3.23	3.37	3.34	28.83	40.01	42.58	3.56	3.66		
04-Jun	3.06	3.29	3.14	18.56	30.48	37.60	3.51	3.63		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
05-Jun	2.99	3.15	3.00	8.66	18.68	34.56	3.46	3.59		
08-Jun	2.71	3.00	2.83	6.70	11.31	31.25	3.37	3.54		
09-Jun	2.77	2.90	2.77	5.50	6.95	30.15	3.27	3.50		
10-Jun	2.71	3.03	2.85	9.51	7.24	33.50	3.19	3.45		
11-Jun	2.76	2.99	2.94	13.40	9.47	37.16	3.10	3.41		
12-Jun	2.56	2.96	2.76	16.99	13.30	33.23	3.01	3.37		
15-Jun	2.61	2.64	2.64	14.82	15.07	30.88	2.92	3.32		
16-Jun	2.45	2.55	2.47	8.15	13.32	27.87	2.82	3.26		2.47
17-Jun	2.58	2.63	2.58	5.95	9.64	32.45	2.76	3.21		
18-Jun	2.57	2.80	2.71	10.98	8.36	37.50	2.73	3.16		
19-Jun	2.50	2.77	2.60	14.68	10.54	35.11	2.70	3.11		
22-Jun	2.31	2.59	2.51	17.71	14.46	33.24	2.67	3.06		
23-Jun	2.46	2.76	2.66	22.40	18.26	39.06	2.65	3.02		
24-Jun	2.37	2.51	2.50	25.73	21.95	35.51	2.60	2.97		
25-Jun	2.51	2.70	2.69	37.04	28.39	42.23	2.60	2.92		
26-Jun	2.85	3.03	2.86	50.60	37.79	47.51	2.62	2.89		
29-Jun	2.65	2.84	2.74	62.96	50.20	44.42	2.65	2.84		
30-Jun	2.89	3.08	2.92	71.78	61.78	49.70	2.69	2.81		
01-Jul	2.78	3.00	2.95	74.02	69.59	50.54	2.71	2.78		
02-Jul	2.84	3.01	2.96	82.25	76.02	50.84	2.75	2.77		
06-Jul	3.07	3.32	3.15	83.57	79.95	56.19	2.83	2.77		
07-Jul	3.17	3.35	3.25	85.99	83.94	58.74	2.89	2.78		
08-Jul	3.34	3.42	3.38	89.98	86.51	61.85	2.99	2.80		
09-Jul	3.15	3.33	3.23	89.89	88.62	56.56	3.05	2.83		
10-Jul	3.03	3.26	3.21	86.79	88.89	55.87	3.09	2.84		
13-Jul	3.07	3.24	3.09	77.51	84.73	51.81	3.13	2.85		
14-Jul	3.11	3.26	3.13	74.01	79.44	53.03	3.15	2.87		
15-Jul	2.98	3.17	3.05	66.76	72.76	50.28	3.16	2.89		
16-Jul	2.83	3.05	2.92	55.60	65.46	46.09	3.16	2.91		
17-Jul	2.77	3.08	2.92	43.16	55.17	46.09	3.13	2.93		
20-Jul	3.08	3.14	3.08	39.27	46.01	51.82	3.11	2.94		
21-Jul	3.07	3.29	3.27	53.23	45.22	57.58	3.10	2.97		
22-Jul	3.27	3.47	3.27	65.35	52.62	57.58	3.10	3.01		
23-Jul	3.38	3.45	3.38	78.50	65.69	60.74	3.12	3.05		
24-Jul	2.99	3.22	3.18	72.38	72.08	53.02	3.13	3.08		
27-Jul	3.19	3.42	3.36	76.67	75.85	58.17	3.16	3.11		
28-Jul	3.09	3.23	3.21	68.57	72.54	52.96	3.18	3.13		
29-Jul	2.92	3.22	3.06	62.86	69.37	48.30	3.19	3.14		
30-Jul	2.95	3.16	3.02	46.67	59.37	47.11	3.20	3.15		
31-Jul	2.90	3.18	2.98	35.71	48.41	45.89	3.19	3.15		
03-Aug	3.03	3.19	3.11	38.10	40.16	50.38	3.17	3.15		
04-Aug	2.95	3.07	3.01	37.62	37.14	47.14	3.15	3.15		
05-Aug	2.83	3.22	3.03	40.00	38.57	47.86	3.11	3.14		
06-Aug	2.78	3.02	2.83	26.22	34.61	41.72	3.07	3.11		
07-Aug	2.67	2.89	2.73	17.30	27.84	39.02	3.00	3.09		
10-Aug	2.69	2.81	2.79	9.92	17.81	41.47	2.95	3.07		
11-Aug	2.65	2.76	2.70	9.58	12.27	38.95	2.91	3.05		
12-Aug	2.80	2.99	2.85	15.74	11.75	44.95	2.89	3.04		
13-Aug	2.93	3.06	2.98	25.03	16.78	49.59	2.89	3.03		
14-Aug	2.74	3.00	2.92	38.46	26.41	47.59	2.87	3.03		
17-Aug	2.81	3.00	2.96	47.93	37.14	49.06	2.87	3.03		
18-Aug	2.77	3.12	2.92	49.44	45.28	47.63	2.85	3.03		
19-Aug	2.92	2.95	2.95	51.46	49.61	48.84	2.87	3.01		
20-Aug	2.86	3.09	2.89	47.37	49.42	46.52	2.88	2.99		
21-Aug	2.95	3.23	3.03	53.42	50.75	52.21	2.91	2.98		
24-Aug	3.14	3.32	3.20	63.24	54.67	58.05	2.97	2.98		
25-Aug	3.01	3.16	3.01	67.11	61.26	50.61	2.98	2.96		
26-Aug	2.99	3.26	3.12	68.66	66.34	54.26	3.00	2.96		
27-Aug	3.00	3.29	3.16	66.67	67.48	55.55	3.03	2.96		
28-Aug	2.89	3.03	2.96	64.18	66.50	48.24	3.03	2.96		
31-Aug	2.91	3.11	3.10	61.49	64.11	52.91	3.05	2.96		
01-Sep	3.09	3.36	3.28	65.14	63.60	58.15	3.08	2.97		
02-Sep	3.30	3.42	3.30	77.17	67.93	58.70	3.13	2.99		
03-Sep	3.41	3.45	3.41	87.86	76.72	61.67	3.17	3.00		
04-Sep	3.29	3.50	3.41	88.05	84.36	61.67	3.19	3.03		
08-Sep	3.49	3.67	3.52	87.76	87.89	64.63	3.25	3.07		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
09-Sep	3.41	3.60	3.50	82.72	86.18	63.67	3.29	3.10		
10-Sep	3.53	3.61	3.60	83.84	84.77	66.37	3.34	3.15		
11-Sep	3.49	3.79	3.66	85.20	83.92	67.91	3.42	3.18		
14-Sep	3.42	3.60	3.55	83.30	84.11	62.28	3.47	3.21		
15-Sep	3.61	3.87	3.75	82.21	83.57	67.55	3.52	3.25		
16-Sep	3.42	3.70	3.59	77.51	81.01	60.29	3.55	3.28		
17-Sep	3.58	3.84	3.67	79.59	79.77	62.46	3.58	3.32		
18-Sep	3.64	3.80	3.69	77.42	78.17	63.01	3.61	3.35		
21-Sep	3.62	3.78	3.71	80.11	79.04	63.58	3.64	3.39		
22-Sep	3.62	3.92	3.76	78.45	78.66	65.02	3.66	3.43		
23-Sep	3.75	3.94	3.87	81.11	79.89	68.04	3.69	3.46		
24-Sep	3.99	4.17	3.99	81.13	80.23	70.97	3.73	3.50	3.99	
25-Sep	3.78	3.92	3.92	78.63	80.29	67.10	3.77	3.54		
28-Sep	3.62	3.91	3.82	66.87	75.54	61.90	3.78	3.57		
29-Sep	3.82	4.02	3.87	60.35	68.61	63.43	3.81	3.62		
30-Sep	3.75	3.96	3.93	60.65	62.62	65.23	3.84	3.66		
01-Oct	3.72	4.07	3.90	64.00	61.67	63.54	3.86	3.69		
02-Oct	3.76	3.99	3.95	67.56	64.07	65.16	3.89	3.72		
05-Oct	3.84	3.98	3.94	68.00	66.52	64.54	3.91	3.74		
06-Oct	4.01	4.17	4.11	76.61	70.72	69.77	3.94	3.78		
07-Oct	3.92	4.23	4.03	75.46	73.36	64.92	3.94	3.80		
08-Oct	4.15	4.38	4.22	78.66	76.91	70.21	3.97	3.83	4.22	
09-Oct	4.31	4.56	4.39	76.03	76.72	74.00	4.04	3.87	4.39	
12-Oct	4.26	4.33	4.30	77.73	77.47	69.00	4.09	3.90		
13-Oct	4.08	4.36	4.23	73.05	75.60	65.31	4.12	3.94		
14-Oct	4.00	4.17	4.13	63.83	71.54	60.34	4.14	3.95		
15-Oct	3.91	4.14	4.07	55.67	64.18	57.51	4.16	3.98		
16-Oct	4.19	4.21	4.21	53.49	57.66	61.99	4.19	4.00		
19-Oct	4.17	4.48	4.28	57.62	55.59	64.03	4.21	4.03		
20-Oct	4.35	4.46	4.41	69.05	60.05	67.52	4.25	4.06		
21-Oct	4.35	4.50	4.36	74.60	67.09	64.91	4.26	4.09		
22-Oct	4.09	4.33	4.17	67.66	70.44	56.06	4.24	4.11		
23-Oct	3.99	4.14	4.08	49.00	63.75	52.41	4.22	4.11		
26-Oct	4.11	4.44	4.27	42.46	53.04	58.54	4.22	4.13		
27-Oct	3.95	4.11	4.11	37.44	42.96	52.42	4.22	4.14		
28-Oct	4.17	4.34	4.28	47.69	42.53	57.50	4.24	4.16		
29-Oct	4.14	4.34	4.14	42.23	42.45	52.52	4.23	4.17		
30-Oct	4.14	4.27	4.16	46.09	45.34	53.15	4.22	4.18		
02-Nov	4.22	4.36	4.26	46.89	45.07	56.25	4.20	4.20		
03-Nov	4.15	4.27	4.21	50.85	47.94	54.31	4.19	4.21		
04-Nov	4.31	4.53	4.41	63.16	53.63	60.21	4.21	4.22		
05-Nov	4.34	4.55	4.47	72.27	62.09	61.80	4.26	4.25		
06-Nov	4.22	4.37	4.37	78.66	71.36	57.66	4.27	4.25		
09-Nov	4.53	4.64	4.56	81.69	77.54	62.76	4.32	4.26		
10-Nov	4.52	4.83	4.63	78.56	79.64	64.46	4.36	4.28		
11-Nov	4.44	4.58	4.49	75.68	78.64	58.69	4.40	4.29		
12-Nov	4.48	4.80	4.61	71.21	75.15	61.84	4.45	4.31		
13-Nov	4.33	4.62	4.46	64.77	70.56	56.08	4.47	4.33		
16-Nov	4.29	4.41	4.32	53.01	63.00	51.28	4.48	4.34		
17-Nov	4.13	4.26	4.26	34.20	50.66	49.33	4.46	4.33		
18-Nov	4.15	4.42	4.34	24.89	37.37	51.95	4.45	4.33		
19-Nov	4.46	4.62	4.54	35.71	31.60	57.83	4.47	4.34		
20-Nov	4.17	4.47	4.36	40.48	33.69	51.70	4.45	4.35		
23-Nov	4.30	4.37	4.33	40.00	38.73	50.74	4.41	4.36		
24-Nov	4.39	4.60	4.43	34.76	38.41	53.83	4.41	4.37		
25-Nov	4.19	4.42	4.26	30.00	34.92	48.28	4.37	4.38		
27-Nov	4.15	4.36	4.18	22.86	29.21	45.88	4.34	4.37		
30-Nov	3.96	4.19	4.15	15.85	22.90	44.98	4.32	4.37		
01-Dec	3.99	4.03	4.00	11.25	16.65	40.67	4.29	4.36		
02-Dec	3.72	4.04	3.86	13.19	13.43	37.10	4.23	4.34		
03-Dec	3.56	3.90	3.70	10.31	11.58	33.48	4.14	4.32		
04-Dec	3.64	3.84	3.73	14.07	12.52	34.77	4.07	4.29		
07-Dec	3.53	3.69	3.54	10.05	11.48	30.72	3.98	4.24		
08-Dec	3.40	3.79	3.60	11.12	11.75	33.36	3.89	4.21		
09-Dec	3.44	3.74	3.58	10.69	10.62	32.91	3.82	4.16		
10-Dec	3.43	3.62	3.60	15.94	12.58	33.87	3.75	4.11		
11-Dec	3.45	3.70	3.54	14.36	13.66	32.37	3.68	4.07		
14-Dec	3.59	3.69	3.60	15.00	15.10	35.44	3.64	4.02		

SAMPLE 7

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	3.19	3.36	3.19							
04-Dec	2.96	3.19	3.02							
05-Dec	2.71	2.97	2.84							
08-Dec	2.63	2.79	2.71							
09-Dec	2.65	2.95	2.82							
10-Dec	2.67	2.84	2.67							
11-Dec	2.75	2.91	2.85							
12-Dec	2.68	2.98	2.83							
15-Dec	2.77	2.82	2.80				2.86			
16-Dec	2.59	2.75	2.65				2.80			
17-Dec	2.54	2.62	2.59				2.75			
18-Dec	2.71	2.91	2.74				2.74			
19-Dec	2.77	2.93	2.77				2.75			
22-Dec	2.83	3.00	2.95				2.76			
23-Dec	2.97	3.09	3.06				2.80			
24-Dec	3.06	3.13	3.13	76.67		53.55	2.84			
26-Dec	3.17	3.37	3.25	88.51		57.12	2.88			
29-Dec	3.08	3.29	3.26	90.76	85.31	57.42	2.93			
30-Dec	3.28	3.52	3.46	88.72	89.33	62.90	3.02			
31-Dec	3.36	3.54	3.50	92.21	90.56	63.90	3.12			
02-Jan	3.34	3.44	3.35	90.29	90.41	57.62	3.19	2.97		
05-Jan	3.09	3.28	3.26	83.00	88.50	54.18	3.25	2.98		
06-Jan	3.12	3.18	3.16	71.67	81.65	50.57	3.27	2.98		
07-Jan	3.17	3.27	3.17	65.67	73.44	50.92	3.28	3.00		
08-Jan	3.09	3.36	3.17	60.14	65.82	50.92	3.29	3.02		
09-Jan	3.08	3.35	3.19	57.66	61.15	51.72	3.28	3.04		
12-Jan	2.88	3.07	2.99	44.17	53.99	44.01	3.25	3.05		
13-Jan	2.89	2.99	2.91	27.21	43.01	41.36	3.19	3.06		
14-Jan	2.78	2.99	2.79	9.47	26.95	37.68	3.11	3.05		
15-Jan	2.88	3.06	2.88	6.34	14.34	41.85	3.06	3.06		
16-Jan	2.95	3.25	3.07	17.54	11.12	49.53	3.04	3.08		
20-Jan	2.72	2.96	2.92	25.24	16.37	44.53	3.01	3.09		
21-Jan	2.67	2.95	2.83	26.98	23.25	41.81	2.97	3.10		
22-Jan	2.72	2.89	2.86	22.49	24.90	43.06	2.94	3.10		
23-Jan	2.79	2.87	2.80	20.64	23.37	41.15	2.89	3.10		
26-Jan	2.64	2.82	2.68	16.36	19.83	37.57	2.86	3.08		
27-Jan	2.50	2.70	2.69	15.50	17.50	38.05	2.84	3.06		
28-Jan	2.57	2.69	2.69	16.58	16.14	38.05	2.82	3.03		
29-Jan	2.31	2.57	2.50	20.82	17.63	32.50	2.78	2.99		
30-Jan	2.31	2.56	2.36	15.23	17.54	29.13	2.70	2.94		2.36
02-Feb	2.30	2.55	2.44	12.78	16.27	33.38	2.65	2.89		
03-Feb	2.44	2.66	2.64	18.62	15.54	42.65	2.63	2.86		
04-Feb	2.30	2.48	2.44	21.75	17.71	37.09	2.58	2.82		
05-Feb	2.49	2.50	2.50	23.86	21.41	39.63	2.55	2.79		
06-Feb	2.36	2.59	2.56	25.06	23.56	42.15	2.54	2.76		
09-Feb	2.27	2.45	2.36	24.56	24.49	36.66	2.50	2.72		
10-Feb	2.18	2.39	2.29	22.71	24.11	34.95	2.45	2.68		
11-Feb	2.39	2.44	2.43	21.65	22.97	40.90	2.45	2.65		
12-Feb	2.44	2.63	2.52	34.95	26.44	44.42	2.46	2.63		
13-Feb	2.47	2.59	2.58	55.43	37.34	46.70	2.48	2.62		
17-Feb	2.49	2.80	2.66	69.16	53.18	49.67	2.48	2.61		
18-Feb	2.49	2.73	2.63	75.64	66.74	48.58	2.50	2.59		
19-Feb	2.50	2.75	2.66	75.81	73.53	49.77	2.52	2.58		
20-Feb	2.54	2.80	2.63	74.19	75.21	48.56	2.53	2.57		
23-Feb	2.53	2.77	2.65	75.27	75.09	49.44	2.56	2.56		
24-Feb	2.72	2.78	2.77	81.18	76.88	54.48	2.61	2.56		
25-Feb	2.92	3.01	2.92	86.71	81.05	59.87	2.67	2.57		
26-Feb	2.89	3.25	3.05	88.54	85.48	63.86	2.73	2.58		
27-Feb	3.04	3.13	3.08	84.86	86.70	64.73	2.78	2.60		
02-Mar	2.86	2.93	2.92	78.19	83.86	56.85	2.81	2.62		
03-Mar	2.95	3.28	3.11	78.06	80.37	62.66	2.87	2.66		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	3.02	3.12	3.10	76.21	77.49	62.19	2.91	2.69		
05-Mar	3.04	3.36	3.17	79.37	77.88	64.23	2.97	2.72		
06-Mar	3.13	3.29	3.13	76.93	77.50	62.16	3.03	2.75		
09-Mar	2.97	3.27	3.10	74.11	76.80	60.59	3.06	2.78		
10-Mar	3.25	3.37	3.27	77.39	76.14	65.87	3.10	2.81		
11-Mar	2.90	3.09	3.08	74.70	75.40	56.73	3.11	2.85		
12-Mar	3.03	3.31	3.12	74.74	75.61	58.05	3.11	2.88		
13-Mar	2.79	3.00	2.95	57.03	68.82	50.93	3.11	2.91		
16-Mar	2.96	3.21	3.12	54.17	61.98	56.65	3.12	2.94		
17-Mar	3.04	3.32	3.14	50.88	54.03	57.28	3.12	2.96		
18-Mar	3.24	3.29	3.29	67.82	57.62	61.78	3.13	2.99		
19-Mar	3.38	3.48	3.45	80.73	66.48	65.90	3.17	3.03		
20-Mar	3.26	3.52	3.37	87.10	78.55	62.28	3.20	3.07		
23-Mar	3.17	3.42	3.32	82.57	83.47	60.06	3.20	3.10		
24-Mar	3.20	3.42	3.26	72.15	80.61	57.42	3.22	3.13		
25-Mar	3.06	3.36	3.24	66.21	73.64	56.53	3.24	3.15		
26-Mar	2.99	3.34	3.19	60.27	66.21	54.26	3.26	3.16		
27-Mar	3.08	3.38	3.19	57.08	61.19	54.26	3.27	3.17		
30-Mar	3.25	3.32	3.29	59.36	58.90	58.16	3.29	3.18		
31-Mar	3.21	3.51	3.39	68.49	61.64	61.68	3.30	3.20		
01-Apr	3.50	3.72	3.54	77.11	68.32	66.26	3.31	3.22		
02-Apr	3.64	3.88	3.74	82.54	76.05	71.20	3.35	3.25	3.74	
03-Apr	3.54	3.65	3.54	75.74	78.46	61.50	3.38	3.27		
06-Apr	3.61	3.84	3.74	76.95	78.41	66.43	3.43	3.30		
07-Apr	3.69	3.87	3.74	76.78	76.49	66.43	3.48	3.33		
08-Apr	3.63	3.84	3.68	82.02	78.58	63.59	3.54	3.35		
09-Apr	3.67	3.93	3.80	82.66	80.49	66.66	3.61	3.39		
13-Apr	3.50	3.78	3.67	78.68	81.12	60.70	3.65	3.41		
14-Apr	3.37	3.57	3.56	73.05	78.13	56.13	3.67	3.44		
15-Apr	3.37	3.56	3.56	64.54	72.09	56.13	3.67	3.46		
16-Apr	3.64	3.90	3.74	66.31	67.97	61.61	3.67	3.49		
17-Apr	3.49	3.78	3.63	65.54	65.46	56.93	3.68	3.51		
20-Apr	3.48	3.61	3.49	58.29	63.38	51.56	3.65	3.51		
21-Apr	3.65	3.79	3.69	51.46	58.43	57.70	3.65	3.52		
22-Apr	3.72	3.86	3.80	57.61	55.78	60.65	3.66	3.55		
23-Apr	3.73	4.02	3.85	69.26	59.44	61.95	3.67	3.57		
24-Apr	3.92	4.20	4.00	75.51	67.46	65.63	3.70	3.61		
27-Apr	3.93	4.23	4.04	75.89	73.55	66.55	3.76	3.65		
28-Apr	3.85	3.96	3.88	71.04	74.15	59.63	3.79	3.68		
29-Apr	3.66	3.81	3.68	57.75	68.23	52.30	3.78	3.70		
30-Apr	3.62	3.84	3.78	47.67	58.82	55.26	3.80	3.72		
01-May	3.64	3.84	3.81	44.96	50.13	56.14	3.84	3.73		
04-May	3.97	4.18	4.01	57.75	50.13	61.56	3.87	3.75		
05-May	3.92	4.31	4.11	67.16	56.62	63.96	3.91	3.77		
06-May	3.93	4.16	4.09	74.61	66.51	63.11	3.93	3.79		
07-May	3.89	4.12	4.06	73.09	71.62	61.79	3.94	3.81		
08-May	3.78	4.13	3.95	63.73	70.48	57.06	3.93	3.82		
11-May	3.73	3.87	3.79	47.45	61.42	50.95	3.92	3.82		
12-May	3.84	3.92	3.87	36.23	49.14	53.63	3.94	3.83		
13-May	3.72	3.80	3.75	26.57	36.75	49.29	3.94	3.84		
14-May	3.49	3.60	3.58	22.02	28.27	43.87	3.91	3.84		
15-May	3.37	3.61	3.56	16.68	21.75	43.27	3.86	3.83		
18-May	3.30	3.47	3.47	16.01	18.23	40.57	3.79	3.82		
19-May	3.58	3.68	3.64	23.57	18.75	47.26	3.74	3.83		
20-May	3.55	3.76	3.60	26.73	22.10	45.95	3.69	3.82		
21-May	3.45	3.76	3.59	30.69	27.00	45.61	3.65	3.81		
22-May	3.50	3.66	3.50	26.07	27.83	42.55	3.62	3.80		
26-May	3.22	3.43	3.34	20.43	25.73	37.71	3.56	3.77		
27-May	3.15	3.32	3.20	12.56	19.69	34.06	3.50	3.73		
28-May	2.97	3.28	3.12	10.27	14.42	32.15	3.45	3.69		
29-May	3.21	3.30	3.30	17.59	13.47	40.28	3.42	3.67		
01-Jun	3.25	3.56	3.36	29.57	19.14	42.75	3.41	3.65		
02-Jun	3.04	3.36	3.18	33.70	26.95	37.72	3.35	3.62		
03-Jun	2.98	3.27	3.08	26.76	30.01	35.24	3.30	3.58		
04-Jun	2.95	3.22	3.08	18.42	26.29	35.24	3.24	3.53		
05-Jun	2.88	3.02	2.95	12.64	19.28	32.06	3.18	3.47		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	3.05	3.16	3.08	15.58	15.55	38.07	3.15	3.43		
09-Jun	2.93	3.06	3.00	14.77	14.33	35.96	3.13	3.38		
10-Jun	2.78	3.07	2.91	16.54	15.63	33.70	3.10	3.34		
11-Jun	2.98	3.21	3.10	21.09	17.47	42.00	3.08	3.30		
12-Jun	3.15	3.34	3.23	35.77	24.47	46.90	3.07	3.28		
15-Jun	2.93	3.09	3.04	42.46	33.11	41.39	3.05	3.25		
16-Jun	2.95	3.22	3.02	40.60	39.61	40.85	3.05	3.23		
17-Jun	3.02	3.26	3.17	38.03	40.37	46.52	3.06	3.21		
18-Jun	3.09	3.31	3.24	46.58	41.74	48.98	3.09	3.19		
19-Jun	2.88	3.19	3.08	53.57	46.06	44.00	3.09	3.17		
22-Jun	2.82	2.95	2.92	45.23	48.46	39.66	3.08	3.14		
23-Jun	2.56	2.84	2.74	33.27	44.02	35.43	3.06	3.10		
24-Jun	2.54	2.65	2.65	20.61	33.04	33.50	3.01	3.07		
25-Jun	2.42	2.79	2.61	19.16	24.35	32.65	2.94	3.04		
26-Jun	2.21	2.56	2.41	17.37	19.05	28.73	2.87	3.01		2.41
29-Jun	2.18	2.37	2.33	17.09	17.87	27.32	2.79	2.96		2.33
30-Jun	2.28	2.56	2.46	18.26	17.57	33.08	2.72	2.92		
01-Jul	2.34	2.54	2.49	21.26	18.87	34.37	2.63	2.89		
02-Jul	2.27	2.37	2.34	21.67	20.40	31.13	2.55	2.85		
06-Jul	2.35	2.50	2.48	22.48	21.81	37.09	2.50	2.82		
07-Jul	2.20	2.40	2.29	16.81	20.32	32.93	2.45	2.79		
08-Jul	2.14	2.26	2.23	14.66	17.98	31.72	2.40	2.75		
09-Jul	1.98	2.24	2.11	9.39	13.62	29.39	2.35	2.71		2.11
10-Jul	2.07	2.28	2.10	10.27	11.44	29.20	2.31	2.67		2.10
13-Jul	1.99	2.21	2.16	14.68	11.45	32.07	2.30	2.62		
14-Jul	1.89	2.17	2.09	18.51	14.49	30.51	2.25	2.57		
15-Jul	1.89	2.14	1.95	16.61	16.60	27.63	2.19	2.52		1.95
16-Jul	1.96	2.07	2.05	17.59	17.57	32.54	2.16	2.47		
17-Jul	1.87	2.11	1.95	14.05	16.08	30.32	2.10	2.41		
20-Jul	1.63	1.85	1.81	18.28	16.64	27.50	2.05	2.35		1.81
21-Jul	1.90	1.96	1.92	20.94	17.75	32.79	2.02	2.29		
22-Jul	1.93	2.02	1.96	29.72	22.98	34.66	2.00	2.24		
23-Jul	1.66	1.89	1.85	31.70	27.45	32.02	1.97	2.20		
24-Jul	1.48	1.73	1.68	28.32	29.91	28.43	1.92	2.16		1.68
27-Jul	1.58	1.73	1.69	24.43	28.15	28.93	1.87	2.11		1.69
28-Jul	1.49	1.74	1.56	19.33	24.02	26.33	1.83	2.07		1.56
29-Jul	1.54	1.88	1.70	21.25	21.67	33.29	1.79	2.04		
30-Jul	1.49	1.75	1.56	16.15	18.91	30.22	1.75	2.00		
31-Jul	1.38	1.45	1.40	13.66	17.02	27.13	1.70	1.95		1.40
03-Aug	1.43	1.68	1.59	13.71	14.51	35.55	1.67	1.91		
04-Aug	1.53	1.87	1.72	25.58	17.65	40.60	1.64	1.87		
05-Aug	1.73	1.98	1.91	48.94	29.41	47.13	1.65	1.86		
06-Aug	1.81	2.05	1.99	70.07	48.20	49.64	1.68	1.85		
07-Aug	1.95	2.33	2.15	81.57	66.86	54.31	1.73	1.85		
10-Aug	1.93	2.11	2.00	79.12	76.92	49.66	1.78	1.84		
11-Aug	2.06	2.39	2.19	75.50	78.73	54.92	1.83	1.84		
12-Aug	2.01	2.24	2.11	72.58	75.73	52.44	1.90	1.84		
13-Aug	2.17	2.49	2.29	78.15	75.41	57.14	1.99	1.86		
14-Aug	2.40	2.45	2.42	82.65	77.79	60.20	2.09	1.88		
17-Aug	2.22	2.39	2.25	84.68	81.83	54.70	2.15	1.89		
18-Aug	2.26	2.53	2.34	85.18	84.17	56.94	2.19	1.92		
19-Aug	2.24	2.36	2.29	80.33	83.40	55.30	2.23	1.94		
20-Aug	2.17	2.41	2.24	78.75	81.42	53.64	2.24	1.95		
21-Aug	2.11	2.26	2.22	73.92	77.67	52.96	2.26	1.97		
24-Aug	2.15	2.31	2.27	70.05	74.24	54.52	2.27	1.99		
25-Aug	2.06	2.25	2.19	63.09	69.02	51.57	2.28	2.02		
26-Aug	2.23	2.35	2.30	60.65	64.60	55.16	2.28	2.05		
27-Aug	2.16	2.36	2.33	60.37	61.37	56.12	2.27	2.08		
28-Aug	2.32	2.59	2.49	70.36	63.79	60.92	2.30	2.13		
31-Aug	2.36	2.52	2.51	78.54	69.76	61.48	2.32	2.18		
01-Sep	2.39	2.71	2.58	82.99	77.30	63.48	2.35	2.23		
02-Sep	2.54	2.84	2.67	81.47	81.00	65.92	2.40	2.27		
03-Sep	2.40	2.55	2.55	73.68	79.38	60.14	2.43	2.30		
04-Sep	2.29	2.54	2.42	62.39	72.51	54.56	2.45	2.32		
08-Sep	2.43	2.48	2.46	53.42	63.16	55.92	2.48	2.34		
09-Sep	2.48	2.68	2.62	56.41	57.41	60.94	2.51	2.37		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	2.47	2.58	2.50	59.83	56.55	55.80	2.53	2.38		
11-Sep	2.34	2.58	2.45	59.40	58.55	53.77	2.53	2.40		
14-Sep	2.28	2.52	2.38	49.15	56.13	50.97	2.51	2.40		
15-Sep	2.07	2.41	2.23	37.27	48.61	45.51	2.48	2.39		
16-Sep	2.30	2.45	2.34	32.29	39.57	49.76	2.44	2.40		
17-Sep	2.47	2.56	2.47	35.93	35.16	54.30	2.43	2.41		
18-Sep	2.39	2.55	2.41	43.72	37.31	51.97	2.43	2.41		
21-Sep	2.49	2.58	2.49	50.22	43.29	54.76	2.43	2.42		
22-Sep	2.51	2.56	2.55	53.68	49.21	56.79	2.42	2.44		
23-Sep	2.53	2.59	2.55	65.19	56.36	56.79	2.43	2.45		
24-Sep	2.51	2.72	2.60	74.19	64.35	58.59	2.45	2.47		
25-Sep	2.33	2.52	2.42	71.36	70.25	50.46	2.45	2.48		
28-Sep	2.47	2.54	2.47	65.64	70.40	52.43	2.48	2.48		
29-Sep	2.29	2.59	2.48	59.49	65.50	52.84	2.49	2.48		
30-Sep	2.33	2.61	2.50	63.59	62.91	53.69	2.50	2.48		
01-Oct	2.38	2.68	2.52	66.15	63.08	54.57	2.51	2.48		
02-Oct	2.31	2.48	2.42	63.08	64.27	49.50	2.50	2.47		
05-Oct	2.44	2.76	2.59	62.30	63.84	56.84	2.51	2.47		
06-Oct	2.53	2.54	2.54	56.96	60.78	54.34	2.50	2.48		
07-Oct	2.63	2.84	2.64	60.22	59.83	58.29	2.51	2.48		
08-Oct	2.62	2.96	2.81	64.81	60.66	64.00	2.55	2.49		
09-Oct	2.88	2.91	2.90	77.43	67.49	66.60	2.60	2.51		
12-Oct	2.96	3.02	3.01	89.10	77.11	69.51	2.66	2.54		
13-Oct	2.91	3.10	3.00	92.44	86.32	68.92	2.71	2.57		
14-Oct	2.94	3.03	2.96	89.67	90.40	66.50	2.76	2.60		
15-Oct	2.79	2.96	2.94	83.54	88.55	65.27	2.82	2.63		
16-Oct	2.94	3.11	3.10	87.25	86.82	70.05	2.88	2.66	3.10	
19-Oct	3.14	3.24	3.22	92.29	87.69	73.05	2.95	2.70	3.22	
20-Oct	2.95	3.03	3.03	91.35	90.30	62.40	3.00	2.73		
21-Oct	3.11	3.37	3.23	87.35	90.33	67.73	3.04	2.76		
22-Oct	3.36	3.51	3.37	83.71	87.47	70.85	3.10	2.80	3.37	
23-Oct	3.26	3.56	3.36	84.76	85.28	70.33	3.13	2.83	3.36	
26-Oct	3.06	3.32	3.25	78.17	82.22	64.68	3.16	2.87		
27-Oct	3.18	3.43	3.27	72.25	78.40	65.22	3.20	2.91		
28-Oct	3.12	3.29	3.17	61.84	70.75	60.20	3.22	2.94		
29-Oct	2.94	3.29	3.10	52.92	62.34	56.90	3.22	2.97		
30-Oct	3.03	3.31	3.17	46.32	53.69	59.30	3.22	3.00		
02-Nov	3.06	3.18	3.14	45.02	48.09	57.81	3.23	3.04		
03-Nov	2.92	3.20	3.07	43.72	45.02	54.38	3.21	3.06		
04-Nov	2.84	3.03	2.90	30.05	39.60	47.08	3.16	3.08		
05-Nov	2.78	2.90	2.79	15.33	29.70	43.05	3.10	3.09		
06-Nov	2.82	2.97	2.84	5.77	17.05	45.34	3.05	3.09		
09-Nov	2.51	2.72	2.71	9.34	10.15	40.75	2.99	3.08		
10-Nov	2.56	2.65	2.59	11.45	8.85	37.03	2.92	3.06		
11-Nov	2.54	2.64	2.64	13.02	11.27	39.51	2.87	3.04		
12-Nov	2.69	2.85	2.73	14.64	13.04	43.80	2.82	3.03		
13-Nov	2.69	2.99	2.87	25.14	17.60	49.77	2.79	3.03		
16-Nov	2.98	3.19	3.01	41.85	27.21	54.93	2.79	3.02		
17-Nov	2.84	3.09	2.90	50.13	39.04	50.54	2.79	3.01		
18-Nov	2.94	3.04	3.04	59.17	50.38	55.42	2.81	3.01		
19-Nov	2.94	3.16	3.11	67.32	58.87	57.67	2.84	3.00		
20-Nov	3.02	3.14	3.07	78.12	68.20	55.93	2.88	2.99		
23-Nov	3.04	3.18	3.06	83.00	76.15	55.48	2.94	2.97		
24-Nov	2.80	3.02	2.87	71.66	77.59	47.64	2.96	2.95		
25-Nov	2.85	3.05	3.03	70.10	74.92	53.59	3.00	2.94		
27-Nov	2.94	3.09	3.08	71.08	70.95	55.30	3.02	2.94		
30-Nov	2.80	3.00	2.94	73.94	71.71	49.77	3.01	2.93		
01-Dec	2.75	2.89	2.76	59.74	68.25	43.72	3.00	2.91		
02-Dec	2.82	2.99	2.91	46.46	60.05	49.26	2.98	2.90		
03-Dec	2.78	3.02	2.88	38.62	48.27	48.23	2.96	2.89		
04-Dec	2.93	3.17	2.97	44.00	43.03	51.49	2.94	2.90		
07-Dec	2.99	3.24	3.05	49.74	44.12	54.24	2.94	2.91		
08-Dec	3.05	3.29	3.17	63.00	52.25	58.08	2.98	2.92		
09-Dec	3.21	3.53	3.34	71.55	61.43	62.84	3.01	2.95		
10-Dec	3.05	3.25	3.17	69.09	67.88	55.99	3.02	2.98		
11-Dec	3.07	3.32	3.27	65.38	68.67	58.83	3.06	3.01		
14-Dec	2.95	3.24	3.07	53.85	62.77	51.65	3.09	3.03		

SAMPLE 8

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.75	2.85	2.80							
04-Dec	2.83	2.87	2.87							
05-Dec	2.67	2.84	2.79							
08-Dec	2.58	2.80	2.68							
09-Dec	2.70	3.03	2.83							
10-Dec	2.78	2.93	2.78							
11-Dec	2.81	2.97	2.96							
12-Dec	2.85	3.00	2.87							
15-Dec	2.68	2.89	2.84				2.82			
16-Dec	2.66	2.90	2.74				2.82			
17-Dec	2.68	2.84	2.80				2.81			
18-Dec	2.90	3.11	2.94				2.83			
19-Dec	2.56	2.91	2.76				2.84			
22-Dec	2.44	2.57	2.56				2.81			
23-Dec	2.44	2.79	2.64				2.79			
24-Dec	2.60	2.78	2.72	29.85		45.10	2.76			
26-Dec	2.46	2.71	2.53	28.36		39.78	2.73			
29-Dec	2.60	2.74	2.66	29.35	29.19	44.59	2.71			
30-Dec	2.81	3.03	2.86	36.32	31.34	51.08	2.72			
31-Dec	2.79	3.03	2.89	54.23	39.97	51.98	2.73			
02-Jan	2.88	3.28	3.08	68.68	53.08	57.38	2.74	2.79		
05-Jan	3.12	3.29	3.25	79.55	67.49	61.54	2.80	2.81		
06-Jan	2.90	3.25	3.07	81.87	76.70	55.37	2.86	2.82		
07-Jan	2.94	3.24	3.11	82.75	81.39	56.42	2.91	2.84		
08-Jan	2.79	3.11	2.93	70.20	78.27	50.67	2.93	2.85		
09-Jan	2.93	2.96	2.94	65.10	72.68	50.97	2.98	2.85		
12-Jan	2.98	3.12	3.08	63.92	66.41	55.07	3.02	2.87		
13-Jan	2.82	2.99	2.91	63.14	64.05	49.64	3.03	2.87		
14-Jan	2.73	2.97	2.82	57.99	61.68	46.99	3.02	2.86		
15-Jan	2.70	2.82	2.81	46.95	56.02	46.70	2.99	2.86		
16-Jan	2.73	2.99	2.82	39.14	48.02	47.06	2.94	2.87		
20-Jan	2.86	3.19	3.00	41.63	42.57	53.20	2.94	2.88		
21-Jan	3.01	3.17	3.09	49.61	43.46	55.96	2.93	2.88		
22-Jan	3.15	3.15	3.15	64.41	51.88	57.74	2.96	2.90		
23-Jan	3.03	3.20	3.12	71.19	61.73	56.51	2.98	2.93		
26-Jan	3.01	3.16	3.10	73.39	69.66	55.65	2.98	2.95		
27-Jan	3.05	3.29	3.12	71.70	72.09	56.36	3.00	2.97		
28-Jan	3.19	3.34	3.19	73.49	72.86	58.85	3.04	3.00		
29-Jan	3.16	3.42	3.34	78.88	74.69	63.62	3.10	3.03		
30-Jan	3.38	3.61	3.54	85.92	79.43	68.82	3.18	3.06		
02-Feb	3.37	3.59	3.52	90.44	85.08	67.77	3.24	3.09		
03-Feb	3.39	3.54	3.54	91.58	89.31	68.29	3.29	3.12		
04-Feb	3.29	3.68	3.48	87.34	89.78	64.92	3.33	3.13		
05-Feb	3.37	3.49	3.40	80.81	86.57	60.63	3.36	3.14		
06-Feb	3.35	3.70	3.53	76.63	81.59	64.71	3.41	3.16		
09-Feb	3.37	3.69	3.53	75.22	77.55	64.71	3.45	3.19		
10-Feb	3.48	3.66	3.51	75.86	75.90	63.54	3.49	3.22		
11-Feb	3.60	3.88	3.70	75.71	75.60	69.25	3.53	3.25		
12-Feb	3.62	3.71	3.62	73.96	75.18	64.66	3.54	3.28		
13-Feb	3.61	3.96	3.76	75.82	75.16	68.59	3.56	3.33		
17-Feb	3.60	3.89	3.78	75.21	75.00	69.11	3.59	3.37		
18-Feb	3.55	3.77	3.71	74.76	75.26	65.00	3.62	3.42		
19-Feb	3.41	3.64	3.54	61.19	70.39	56.23	3.63	3.44		
20-Feb	3.68	3.80	3.73	57.25	64.40	62.34	3.65	3.47		
23-Feb	3.39	3.55	3.54	46.77	55.07	54.19	3.65	3.49		
24-Feb	3.21	3.54	3.35	40.55	48.19	47.51	3.64	3.50		
25-Feb	3.24	3.45	3.43	28.44	38.58	50.29	3.61	3.52		
26-Feb	3.32	3.48	3.39	24.00	31.00	48.89	3.58	3.53		
27-Feb	3.04	3.34	3.20	23.57	25.34	42.82	3.52	3.53		
02-Mar	2.97	3.31	3.11	18.51	22.03	40.26	3.44	3.52		
03-Mar	2.88	3.14	2.95	12.67	18.25	36.14	3.36	3.49		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	2.69	2.99	2.85	11.07	14.09	33.81	3.28	3.46		
05-Mar	2.69	2.93	2.80	9.25	11.00	32.67	3.18	3.42		
06-Mar	2.92	3.09	2.96	14.59	11.64	39.65	3.12	3.40		
09-Mar	2.91	3.23	3.06	21.50	15.11	43.59	3.08	3.38		
10-Mar	3.08	3.26	3.25	35.43	23.84	50.23	3.06	3.37		
11-Mar	3.32	3.43	3.40	49.25	35.39	54.76	3.06	3.36		
12-Mar	3.32	3.63	3.52	67.57	50.75	58.05	3.10	3.36		
13-Mar	3.33	3.55	3.39	75.58	64.13	53.51	3.13	3.35		
16-Mar	3.04	3.32	3.24	73.76	72.30	48.77	3.16	3.33		
17-Mar	3.12	3.40	3.29	65.60	71.65	50.35	3.21	3.31		
18-Mar	3.33	3.45	3.40	65.96	68.44	53.73	3.28	3.29		
19-Mar	3.41	3.64	3.52	75.58	69.05	57.15	3.34	3.28		
20-Mar	3.34	3.55	3.45	80.97	74.17	54.61	3.38	3.28		
23-Mar	3.51	3.72	3.56	83.94	80.16	57.79	3.42	3.27		
24-Mar	3.51	3.75	3.62	84.07	82.99	59.45	3.44	3.27		
25-Mar	3.74	3.81	3.78	89.62	85.88	63.58	3.47	3.29		
26-Mar	3.66	3.87	3.86	94.45	89.38	65.47	3.52	3.31		
27-Mar	3.70	3.76	3.72	92.52	92.20	59.63	3.58	3.33		
30-Mar	3.57	3.84	3.75	88.81	91.93	60.45	3.63	3.36		
31-Mar	3.65	3.95	3.76	82.20	87.84	60.73	3.67	3.39		
01-Apr	3.80	3.97	3.86	84.28	85.09	63.55	3.71	3.43		
02-Apr	3.67	3.99	3.85	84.19	83.55	63.07	3.75	3.48		
03-Apr	3.73	3.82	3.80	83.87	84.11	60.56	3.78	3.53		
06-Apr	3.74	3.93	3.90	83.26	83.77	63.67	3.81	3.57		
07-Apr	3.93	4.05	4.01	86.30	84.47	66.77	3.83	3.62		
08-Apr	3.84	4.01	3.88	85.60	85.05	60.23	3.84	3.65		
09-Apr	3.60	3.89	3.78	73.47	81.79	55.71	3.84	3.66		
13-Apr	3.48	3.63	3.60	49.04	69.37	48.63	3.83	3.67		
14-Apr	3.69	3.77	3.73	38.30	53.60	53.25	3.82	3.68		
15-Apr	3.69	3.85	3.79	39.77	42.37	55.25	3.82	3.71		
16-Apr	3.77	3.93	3.88	56.14	44.74	58.14	3.82	3.74		
17-Apr	3.61	3.81	3.78	59.06	51.66	53.97	3.82	3.76		
20-Apr	3.67	3.87	3.72	54.97	56.73	51.57	3.80	3.77		
21-Apr	3.57	3.78	3.76	47.95	54.00	53.07	3.77	3.78		
22-Apr	3.76	3.80	3.80	49.12	50.68	54.58	3.76	3.79		
23-Apr	3.75	3.99	3.94	61.99	53.02	59.49	3.78	3.81		
24-Apr	3.66	3.77	3.77	62.57	57.89	52.12	3.80	3.81		
27-Apr	3.73	3.92	3.89	67.84	64.13	56.24	3.81	3.81		
28-Apr	3.68	3.98	3.80	61.06	63.82	52.59	3.82	3.81		
29-Apr	3.43	3.71	3.61	54.82	61.24	45.82	3.79	3.81		
30-Apr	3.55	3.75	3.56	38.58	51.49	44.20	3.76	3.80		
01-May	3.59	3.72	3.59	27.98	40.46	45.44	3.75	3.78		
04-May	3.50	3.64	3.63	29.17	31.91	47.13	3.73	3.77		
05-May	3.65	3.82	3.72	38.69	31.94	50.82	3.72	3.77		
06-May	3.51	3.79	3.61	39.88	35.91	46.55	3.69	3.75		
07-May	3.70	3.93	3.74	46.43	41.67	51.71	3.68	3.74		
08-May	3.70	4.05	3.89	53.90	46.74	56.89	3.68	3.74		
11-May	3.89	4.13	4.01	70.80	57.04	60.54	3.71	3.75		
12-May	4.08	4.10	4.10	84.25	69.65	63.06	3.76	3.78		
13-May	4.09	4.31	4.19	88.31	81.12	65.44	3.83	3.80		
14-May	4.25	4.44	4.34	90.73	87.76	69.02	3.91	3.83		
15-May	4.42	4.55	4.48	90.07	89.70	71.95	4.01	3.85	4.48	
18-May	4.31	4.53	4.45	91.64	90.81	70.41	4.09	3.89	4.45	
19-May	4.15	4.39	4.33	87.96	89.89	64.49	4.17	3.91		
20-May	4.43	4.60	4.50	87.01	88.87	68.53	4.25	3.95		
21-May	4.43	4.51	4.49	86.65	87.21	68.04	4.32	3.98		
22-May	4.38	4.63	4.47	88.87	87.51	67.01	4.37	4.01		
26-May	4.46	4.70	4.64	90.22	88.58	71.03	4.43	4.05	4.64	
27-May	4.44	4.78	4.59	87.69	88.93	68.39	4.48	4.08		
28-May	4.34	4.58	4.45	82.27	86.73	61.49	4.49	4.11		
29-May	4.19	4.56	4.39	69.34	79.77	58.76	4.48	4.15		
01-Jun	4.20	4.37	4.24	49.49	67.04	52.48	4.46	4.18		
02-Jun	4.23	4.40	4.29	36.01	51.62	54.24	4.45	4.22		
03-Jun	4.33	4.51	4.40	30.51	38.67	57.92	4.44	4.25		
04-Jun	4.34	4.70	4.53	43.00	36.50	61.83	4.44	4.29		
05-Jun	4.35	4.60	4.55	54.50	42.67	62.41	4.45	4.34		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	4.55	4.80	4.75	72.04	56.51	67.69	4.47	4.38		
09-Jun	4.74	5.00	4.87	79.92	68.82	70.37	4.50	4.43		
10-Jun	4.91	5.06	4.94	87.49	79.81	71.85	4.55	4.48	4.94	
11-Jun	4.84	5.14	4.98	84.44	83.95	72.68	4.62	4.52	4.98	
12-Jun	5.05	5.14	5.14	89.79	87.24	75.77	4.72	4.56	5.14	
15-Jun	5.24	5.36	5.24	90.97	88.40	77.49	4.82	4.61	5.24	
16-Jun	5.41	5.58	5.42	92.74	91.17	80.21	4.94	4.65	5.42	
17-Jun	5.33	5.59	5.39	87.98	90.56	78.51	5.03	4.70	5.39	
18-Jun	5.14	5.32	5.30	84.45	88.39	73.47	5.11	4.74	5.30	
19-Jun	4.99	5.34	5.15	77.50	83.31	65.89	5.16	4.77		
22-Jun	4.91	5.12	5.00	66.65	76.20	59.30	5.17	4.80		
23-Jun	4.79	4.94	4.85	53.87	66.01	53.53	5.16	4.81		
24-Jun	4.63	4.83	4.75	42.08	54.20	50.04	5.14	4.82		
25-Jun	4.62	4.82	4.67	28.20	41.38	47.37	5.09	4.82		
26-Jun	4.41	4.66	4.55	18.55	29.61	43.62	5.01	4.83		
29-Jun	4.50	4.52	4.50	10.34	19.03	42.12	4.91	4.83		
30-Jun	4.27	4.63	4.44	10.79	13.23	40.34	4.80	4.84		
01-Jul	4.29	4.61	4.43	10.88	10.67	40.03	4.70	4.85		
02-Jul	4.25	4.50	4.30	9.58	10.41	36.20	4.61	4.85		
06-Jul	4.20	4.52	4.32	8.16	9.54	37.19	4.53	4.84		
07-Jul	4.28	4.29	4.28	6.04	7.93	35.98	4.47	4.82		
08-Jul	4.19	4.32	4.28	7.40	7.20	35.98	4.42	4.80		
09-Jul	4.14	4.29	4.20	6.19	6.55	33.46	4.37	4.77		
10-Jul	4.31	4.55	4.37	12.10	8.57	42.67	4.35	4.74		
13-Jul	4.31	4.67	4.51	24.91	14.40	48.93	4.35	4.72		
14-Jul	4.42	4.65	4.50	40.63	25.88	48.53	4.35	4.69		
15-Jul	4.42	4.62	4.44	47.51	37.68	46.04	4.36	4.65		
16-Jul	4.15	4.35	4.28	40.90	43.02	40.15	4.35	4.60		
17-Jul	4.19	4.33	4.22	28.54	38.99	38.18	4.34	4.54		
20-Jul	4.12	4.40	4.25	21.72	30.39	39.77	4.34	4.49		
21-Jul	4.00	4.24	4.08	16.89	22.38	34.36	4.32	4.44		
22-Jul	3.96	4.17	4.13	19.84	19.48	37.07	4.31	4.40		
23-Jul	3.93	4.03	4.03	16.47	17.73	34.04	4.27	4.36		
24-Jul	3.83	3.95	3.86	13.68	16.66	29.62	4.20	4.32		3.86
27-Jul	3.65	3.74	3.66	6.02	12.05	25.43	4.11	4.27		3.66
28-Jul	3.54	3.86	3.73	7.12	8.94	29.20	4.03	4.23		3.73
29-Jul	3.79	4.03	3.89	16.26	9.80	37.05	3.98	4.20		
30-Jul	3.85	3.99	3.96	28.32	17.23	40.17	3.95	4.18		
31-Jul	4.01	4.13	4.06	38.33	27.63	44.41	3.93	4.16		
03-Aug	3.88	4.08	4.01	42.51	36.39	42.78	3.93	4.15		
04-Aug	3.73	3.96	3.87	42.91	41.25	38.51	3.90	4.12		
05-Aug	3.94	4.11	3.94	42.80	42.74	41.65	3.89	4.11		
06-Aug	3.74	3.90	3.86	40.70	42.14	39.19	3.89	4.09		
07-Aug	3.78	3.96	3.86	43.15	42.21	39.19	3.91	4.07		
10-Aug	3.69	3.98	3.85	44.04	42.63	38.85	3.92	4.05		
11-Aug	3.75	3.95	3.86	49.72	45.64	39.41	3.92	4.02		
12-Aug	3.52	3.82	3.72	45.41	46.39	34.67	3.89	3.98		
13-Aug	3.58	3.79	3.59	32.83	42.65	30.95	3.84	3.94		
14-Aug	3.59	3.88	3.72	25.68	34.64	38.10	3.81	3.91		
17-Aug	3.50	3.70	3.55	17.40	25.31	33.25	3.77	3.88		
18-Aug	3.31	3.47	3.41	17.64	20.24	29.88	3.71	3.84		3.41
19-Aug	3.50	3.69	3.60	18.50	17.85	38.93	3.68	3.82		
20-Aug	3.60	3.85	3.76	34.60	23.58	45.34	3.67	3.80		
21-Aug	3.90	4.05	3.96	57.62	36.91	52.10	3.69	3.80		
24-Aug	3.74	3.84	3.82	67.08	53.10	47.65	3.68	3.79		
25-Aug	3.64	3.94	3.84	72.21	65.64	48.33	3.69	3.80		
26-Aug	3.63	3.90	3.80	67.20	68.83	47.02	3.72	3.81		
27-Aug	3.81	4.05	3.95	74.77	71.39	52.25	3.74	3.81		
28-Aug	3.96	4.29	4.14	79.13	73.70	57.92	3.81	3.82		
31-Aug	3.97	4.16	4.02	81.21	78.37	53.59	3.88	3.82		
01-Sep	3.95	4.22	4.02	76.53	78.96	53.59	3.92	3.82		
02-Sep	3.85	3.93	3.86	67.01	74.92	48.04	3.93	3.82		
03-Sep	3.90	3.93	3.91	63.27	68.93	49.79	3.93	3.81		
04-Sep	3.78	4.01	3.87	58.16	62.81	48.39	3.93	3.81		
08-Sep	3.96	4.09	4.05	62.66	61.36	54.59	3.96	3.82		
09-Sep	4.07	4.23	4.11	66.89	62.57	56.47	3.99	3.84		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	3.85	4.13	4.00	66.53	65.36	52.21	4.00	3.84		
11-Sep	4.03	4.29	4.18	71.10	68.18	57.82	4.00	3.86		
14-Sep	4.37	4.44	4.38	77.33	71.65	63.02	4.04	3.90		
15-Sep	4.10	4.42	4.26	84.57	77.67	58.37	4.07	3.93		
16-Sep	3.89	4.17	4.06	70.93	77.61	51.55	4.09	3.95		
17-Sep	3.85	4.04	4.03	52.69	69.40	50.59	4.10	3.98		
18-Sep	3.98	4.13	3.99	37.37	53.67	49.28	4.12	4.00		
21-Sep	4.02	4.14	4.02	35.35	41.81	50.32	4.11	4.01		
22-Sep	3.63	3.83	3.82	30.55	34.42	43.86	4.08	4.01		
23-Sep	3.61	3.77	3.75	25.56	30.49	41.84	4.05	4.00		
24-Sep	3.77	3.94	3.94	26.69	27.60	48.75	4.03	4.01		
25-Sep	3.57	3.82	3.74	25.39	25.88	42.96	3.96	4.00		
28-Sep	3.68	3.94	3.74	26.28	26.12	42.96	3.90	3.99		
29-Sep	3.86	3.95	3.94	27.20	26.29	49.87	3.89	3.99		
30-Sep	4.01	4.08	4.04	38.70	30.73	52.93	3.89	3.99		
01-Oct	3.97	4.12	4.09	52.11	39.34	54.43	3.90	3.99		
02-Oct	4.11	4.24	4.14	60.28	50.36	55.95	3.91	4.00		
05-Oct	3.85	4.21	4.04	65.66	59.35	52.21	3.94	4.01		
06-Oct	4.04	4.37	4.18	71.15	65.70	56.58	3.98	4.02		
07-Oct	3.83	4.08	4.02	67.55	68.12	50.86	3.99	4.02		
08-Oct	4.02	4.19	4.13	67.50	68.73	54.28	4.04	4.02		
09-Oct	3.87	4.12	4.01	60.42	65.16	50.18	4.07	4.02		
12-Oct	3.64	3.85	3.81	51.67	59.86	44.18	4.05	4.01		
13-Oct	3.70	4.02	3.85	40.00	50.69	45.58	4.03	3.98		
14-Oct	3.66	3.78	3.76	29.58	40.42	42.96	3.99	3.96		
15-Oct	3.80	3.89	3.88	30.54	33.38	47.30	3.96	3.95		
16-Oct	3.69	3.93	3.81	26.64	28.92	45.15	3.94	3.94		
19-Oct	3.82	4.09	3.97	33.79	30.32	50.68	3.92	3.94		
20-Oct	4.12	4.25	4.14	45.66	35.36	55.79	3.93	3.94		
21-Oct	4.10	4.25	4.17	62.10	47.18	56.64	3.93	3.96		
22-Oct	4.29	4.46	4.34	75.49	61.08	61.21	3.97	3.99		
23-Oct	4.19	4.31	4.23	76.64	71.41	57.02	4.02	4.00		
26-Oct	4.17	4.44	4.34	80.89	77.67	59.97	4.07	4.03		
27-Oct	4.16	4.42	4.32	80.08	79.21	59.18	4.13	4.06		
28-Oct	4.21	4.26	4.23	80.08	80.35	55.61	4.17	4.07		
29-Oct	4.20	4.28	4.21	74.80	78.32	54.81	4.22	4.08		
30-Oct	4.06	4.17	4.08	64.65	73.18	49.85	4.23	4.08		
02-Nov	3.88	4.08	3.89	50.25	63.24	43.62	4.20	4.07		
03-Nov	3.84	4.02	3.86	34.44	49.78	42.72	4.17	4.06		
04-Nov	3.91	4.14	3.94	27.77	37.49	45.94	4.12	4.05		
05-Nov	3.80	3.96	3.95	25.76	29.32	46.35	4.09	4.04		
06-Nov	3.69	3.96	3.82	24.03	25.85	41.93	4.03	4.03		
09-Nov	3.62	3.93	3.79	19.95	23.24	40.96	3.97	4.02		
10-Nov	3.58	3.75	3.68	16.16	20.05	37.53	3.91	4.01		
11-Nov	3.66	3.87	3.85	21.00	19.04	45.17	3.87	4.01		
12-Nov	3.67	3.75	3.70	18.90	18.69	40.47	3.83	4.01		
13-Nov	3.73	3.87	3.75	21.86	20.59	42.61	3.82	4.00		
16-Nov	3.66	3.75	3.69	16.64	19.13	40.72	3.80	4.00		
17-Nov	3.76	3.86	3.84	24.37	20.95	47.06	3.79	3.99		
18-Nov	4.02	4.16	4.02	42.48	27.83	53.49	3.79	3.99		
19-Nov	3.97	4.18	4.04	62.80	43.21	54.15	3.82	3.98		
20-Nov	4.02	4.08	4.03	75.41	60.23	53.74	3.84	3.96		
23-Nov	3.79	3.94	3.87	66.67	68.29	47.48	3.87	3.95		
24-Nov	3.52	3.79	3.71	50.71	64.26	42.19	3.85	3.92		
25-Nov	3.63	3.99	3.81	40.35	52.58	46.22	3.86	3.89		
27-Nov	3.64	3.68	3.65	30.81	40.62	41.26	3.85	3.87		
30-Nov	3.44	3.68	3.57	27.07	32.74	39.00	3.84	3.84		
01-Dec	3.73	3.80	3.77	27.29	28.39	46.83	3.83	3.82		
02-Dec	3.55	3.93	3.73	33.78	29.38	45.57	3.80	3.81		
03-Dec	3.74	3.87	3.82	45.05	35.37	48.90	3.77	3.81		
04-Dec	3.58	3.80	3.71	42.34	40.39	45.25	3.74	3.80		
07-Dec	3.57	3.65	3.59	36.04	41.14	41.61	3.71	3.78		
08-Dec	3.40	3.65	3.46	21.48	33.29	38.04	3.68	3.77		
09-Dec	3.55	3.75	3.57	16.59	24.70	42.54	3.65	3.76		
10-Dec	3.63	3.72	3.65	22.08	20.05	45.62	3.65	3.75		
11-Dec	3.60	3.85	3.65	33.64	24.10	45.62	3.66	3.74		
14-Dec	3.47	3.71	3.66	41.07	32.27	46.05	3.65	3.74		

SAMPLE 9

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	3.14	3.28	3.17							
04-Dec	3.08	3.20	3.14							
05-Dec	2.89	3.00	2.95							
08-Dec	2.85	3.03	2.88							
09-Dec	2.75	3.14	2.94							
10-Dec	3.10	3.28	3.14							
11-Dec	2.95	3.18	3.10							
12-Dec	3.08	3.23	3.14							
15-Dec	2.98	3.08	3.08				3.06			
16-Dec	2.87	3.09	3.04				3.05			
17-Dec	2.94	3.19	2.99				3.03			
18-Dec	2.84	2.99	2.94				3.03			
19-Dec	2.87	3.07	3.07				3.05			
22-Dec	3.08	3.27	3.26				3.08			
23-Dec	3.08	3.19	3.17				3.09			
24-Dec	3.13	3.37	3.27	86.45		54.96	3.11			
26-Dec	2.89	3.25	3.09	72.65		47.88	3.10			
29-Dec	2.80	3.08	2.92	55.38	71.49	42.33	3.08			
30-Dec	3.04	3.22	3.11	45.55	57.86	49.39	3.09			
31-Dec	3.14	3.32	3.25	53.58	51.50	53.87	3.12			
02-Jan	2.91	3.23	3.07	60.23	53.12	47.99	3.13	3.08		
05-Jan	2.79	3.04	2.95	51.30	55.04	44.50	3.12	3.07		
06-Jan	2.72	2.93	2.88	33.19	48.24	42.55	3.08	3.06		
07-Jan	2.78	2.84	2.84	23.55	36.02	41.44	3.04	3.05		
08-Jan	2.61	2.85	2.73	19.62	25.46	38.46	2.98	3.05		
09-Jan	2.40	2.71	2.58	17.60	20.26	34.78	2.93	3.03		
12-Jan	2.45	2.71	2.54	16.26	17.83	33.85	2.88	3.00		
13-Jan	2.42	2.56	2.54	15.81	16.56	33.85	2.82	2.97		
14-Jan	2.60	2.84	2.70	19.93	17.33	41.15	2.76	2.95		
15-Jan	2.44	2.55	2.51	19.11	18.28	36.06	2.70	2.93		
16-Jan	2.59	2.78	2.69	24.80	21.28	43.22	2.67	2.91		
20-Jan	2.59	2.85	2.70	25.36	23.09	43.60	2.65	2.90		
21-Jan	2.46	2.74	2.56	27.17	25.78	39.62	2.62	2.88		
22-Jan	2.67	2.76	2.67	27.51	26.68	43.95	2.61	2.86		
23-Jan	2.69	2.98	2.81	37.99	30.89	48.96	2.64	2.84		
26-Jan	2.53	2.85	2.72	50.59	38.70	46.10	2.66	2.82		
27-Jan	2.44	2.70	2.55	48.37	45.65	41.22	2.66	2.78		
28-Jan	2.54	2.90	2.70	44.25	47.74	46.60	2.66	2.76		
29-Jan	2.51	2.56	2.56	35.06	42.56	42.67	2.66	2.75		
30-Jan	2.62	2.84	2.76	46.67	42.00	49.25	2.67	2.73		
02-Feb	2.70	2.85	2.70	46.10	42.61	47.49	2.67	2.70		
03-Feb	2.64	2.80	2.76	56.66	49.81	49.43	2.69	2.69		
04-Feb	2.54	2.91	2.74	54.94	52.57	48.79	2.70	2.68		
05-Feb	2.52	2.61	2.55	45.06	52.22	43.01	2.67	2.66		
06-Feb	2.71	2.79	2.73	43.21	47.74	49.15	2.67	2.66		
09-Feb	2.77	2.77	2.77	45.06	44.44	50.43	2.70	2.66		
10-Feb	2.52	2.85	2.72	55.56	47.94	48.78	2.70	2.67		
11-Feb	2.60	2.65	2.64	50.00	50.21	46.17	2.71	2.67		
12-Feb	2.64	3.01	2.81	51.27	52.27	52.04	2.71	2.68		
13-Feb	2.52	2.72	2.61	43.92	48.40	45.73	2.70	2.68		
17-Feb	2.48	2.81	2.63	41.01	45.40	46.43	2.69	2.68		
18-Feb	2.74	2.93	2.75	36.36	40.43	50.54	2.69	2.69		
19-Feb	2.54	2.65	2.59	33.33	36.90	45.52	2.69	2.68		
20-Feb	2.28	2.52	2.45	31.66	33.78	41.62	2.66	2.68		
23-Feb	2.24	2.46	2.32	18.14	27.71	38.34	2.61	2.66		
24-Feb	2.31	2.53	2.51	22.91	24.24	45.15	2.59	2.65		
25-Feb	2.39	2.73	2.56	29.00	23.35	46.81	2.58	2.64		
26-Feb	2.33	2.52	2.48	35.93	29.28	44.49	2.54	2.64		
27-Feb	2.24	2.38	2.32	27.71	30.88	40.18	2.51	2.62		
02-Mar	2.13	2.47	2.32	21.05	28.23	40.18	2.48	2.61		
03-Mar	2.24	2.28	2.27	15.96	21.57	38.82	2.42	2.58		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	2.14	2.27	2.17	14.02	17.01	36.18	2.38	2.56		
05-Mar	2.19	2.42	2.25	11.82	13.93	39.72	2.36	2.53		
06-Mar	2.10	2.24	2.17	9.33	11.72	37.48	2.34	2.51		
09-Mar	2.03	2.28	2.22	14.85	12.00	39.76	2.31	2.49		
10-Mar	1.97	2.30	2.13	16.87	13.68	37.14	2.26	2.46		
11-Mar	1.86	2.03	1.99	19.04	16.92	33.44	2.20	2.42		
12-Mar	1.99	2.23	2.12	21.96	19.29	39.47	2.18	2.40		
13-Mar	2.08	2.24	2.22	28.74	23.24	43.69	2.17	2.38		
16-Mar	2.02	2.24	2.05	31.03	27.24	38.74	2.15	2.34		
17-Mar	2.12	2.35	2.22	39.25	33.01	45.40	2.15	2.32		
18-Mar	2.04	2.21	2.15	41.31	37.20	43.31	2.14	2.30		
19-Mar	2.16	2.48	2.30	57.68	46.08	48.75	2.16	2.28		
20-Mar	2.12	2.40	2.23	59.40	52.80	46.51	2.16	2.26		
23-Mar	2.07	2.40	2.26	65.05	60.71	47.62	2.17	2.25		
24-Mar	2.22	2.40	2.35	67.74	64.06	50.92	2.21	2.25		
25-Mar	2.26	2.52	2.39	74.62	69.14	52.36	2.24	2.25		
26-Mar	2.29	2.58	2.49	82.28	74.88	55.83	2.27	2.24		
27-Mar	2.49	2.64	2.63	88.84	81.91	60.21	2.34	2.25		
30-Mar	2.29	2.60	2.44	86.86	85.99	52.59	2.36	2.26		
31-Mar	2.20	2.43	2.24	70.51	82.07	45.99	2.37	2.25		
01-Apr	2.05	2.12	2.10	41.91	66.43	42.02	2.35	2.24		
02-Apr	2.03	2.27	2.15	24.11	45.51	43.88	2.34	2.24		
03-Apr	2.16	2.42	2.27	24.41	30.14	48.19	2.34	2.24		
06-Apr	2.14	2.40	2.30	34.86	27.79	49.24	2.33	2.25		
07-Apr	2.15	2.24	2.24	39.34	32.87	47.18	2.32	2.25		
08-Apr	2.17	2.50	2.30	40.98	38.40	49.46	2.30	2.26		
09-Apr	2.37	2.48	2.40	46.45	42.26	53.08	2.27	2.28		
13-Apr	2.23	2.31	2.24	46.45	44.63	47.24	2.25	2.28		
14-Apr	1.94	2.12	2.07	37.88	43.59	41.96	2.23	2.28		
15-Apr	1.91	2.10	2.09	25.89	36.74	42.77	2.23	2.28		
16-Apr	2.09	2.44	2.28	31.30	31.69	49.93	2.24	2.28		
17-Apr	2.34	2.43	2.34	45.89	34.36	51.97	2.25	2.29		
20-Apr	2.26	2.45	2.40	65.35	47.51	53.99	2.26	2.30		
21-Apr	2.47	2.59	2.52	78.36	63.20	57.81	2.29	2.31		
22-Apr	2.32	2.38	2.34	78.66	74.12	50.97	2.30	2.31		
23-Apr	2.13	2.49	2.31	70.59	75.87	49.91	2.29	2.31		
24-Apr	2.13	2.34	2.19	54.41	67.89	45.81	2.28	2.30		
27-Apr	1.87	1.99	1.99	38.89	54.63	39.92	2.27	2.28		
28-Apr	1.90	2.18	2.07	28.54	40.61	43.07	2.27	2.25		
29-Apr	1.83	2.15	1.96	20.52	29.32	39.96	2.24	2.23		
30-Apr	1.71	2.02	1.86	20.64	23.23	37.33	2.18	2.21		
01-May	1.62	1.81	1.77	16.54	19.23	35.08	2.11	2.19		
04-May	1.46	1.71	1.64	16.15	17.78	32.09	2.01	2.17		
05-May	1.51	1.81	1.62	15.18	15.96	31.64	1.93	2.14		
06-May	1.29	1.48	1.46	14.39	15.24	28.24	1.84	2.10		1.46
07-May	1.39	1.54	1.47	13.69	14.42	28.75	1.76	2.06		1.47
08-May	1.41	1.51	1.43	12.56	13.55	27.89	1.70	2.02		1.43
11-May	1.43	1.67	1.58	16.26	14.17	35.68	1.64	1.98		
12-May	1.40	1.47	1.40	14.70	14.51	31.31	1.58	1.94		
13-May	1.38	1.58	1.40	14.60	15.19	31.31	1.53	1.91		
14-May	1.23	1.54	1.38	11.81	13.70	30.82	1.49	1.88		
15-May	1.33	1.72	1.52	18.93	15.11	38.08	1.47	1.84		
18-May	1.49	1.77	1.57	27.76	19.50	40.48	1.47	1.80		
19-May	1.45	1.55	1.49	33.46	26.72	37.94	1.47	1.76		
20-May	1.32	1.69	1.52	39.96	33.73	39.47	1.48	1.71		
21-May	1.30	1.43	1.40	37.41	36.94	35.68	1.47	1.67		
22-May	1.38	1.44	1.40	36.21	37.86	35.68	1.45	1.62		
26-May	1.48	1.59	1.49	35.59	36.40	40.64	1.46	1.59		
27-May	1.55	1.71	1.60	48.66	40.15	46.11	1.49	1.57		
28-May	1.52	1.80	1.68	65.20	49.82	49.74	1.52	1.55		
29-May	1.40	1.68	1.48	63.78	59.21	42.11	1.51	1.53		
01-Jun	1.51	1.58	1.52	57.89	62.29	43.96	1.51	1.52		
02-Jun	1.48	1.55	1.52	48.54	56.74	43.96	1.51	1.50		
03-Jun	1.54	1.75	1.71	61.99	56.14	52.35	1.53	1.51		
04-Jun	1.65	1.91	1.84	74.54	61.69	57.09	1.58	1.52		
05-Jun	1.90	2.07	1.99	87.45	74.66	61.81	1.65	1.54		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	1.78	2.06	1.93	86.65	82.88	59.01	1.70	1.56		
09-Jun	1.80	1.94	1.83	80.09	84.73	54.58	1.72	1.58		
10-Jun	1.80	1.91	1.81	72.29	79.68	53.71	1.74	1.59		
11-Jun	1.73	1.97	1.90	70.14	74.17	57.03	1.78	1.62		
12-Jun	1.73	2.02	1.93	73.57	72.00	58.10	1.83	1.64		
15-Jun	1.76	2.08	1.94	77.96	73.89	58.48	1.88	1.67		
16-Jun	2.04	2.13	2.11	85.26	78.93	64.30	1.92	1.70		
17-Jun	2.09	2.27	2.22	90.31	84.51	67.48	1.96	1.73		
18-Jun	2.29	2.44	2.34	93.70	89.76	70.56	2.00	1.77	2.34	
19-Jun	2.34	2.53	2.41	90.80	91.60	72.22	2.05	1.81	2.41	
22-Jun	2.59	2.62	2.60	92.10	92.20	76.13	2.14	1.87	2.60	
23-Jun	2.56	2.77	2.57	89.62	90.84	74.35	2.22	1.92	2.57	
24-Jun	2.59	2.88	2.75	89.66	90.46	77.72	2.32	1.98	2.75	
25-Jun	2.47	2.74	2.58	81.58	86.96	68.56	2.39	2.03		
26-Jun	2.61	2.75	2.65	80.87	84.04	70.12	2.47	2.08	2.65	
29-Jun	2.61	2.85	2.70	79.42	80.62	71.22	2.54	2.14	2.70	
30-Jun	2.77	2.83	2.77	84.93	81.74	72.73	2.60	2.20	2.77	
01-Jul	2.70	3.04	2.89	87.78	84.04	75.15	2.66	2.26	2.89	
02-Jul	2.96	3.10	3.05	91.75	88.15	77.95	2.73	2.32	3.05	
06-Jul	2.94	3.17	3.13	93.76	91.10	79.21	2.79	2.39	3.13	
07-Jul	3.16	3.30	3.22	95.37	93.63	80.56	2.86	2.44	3.22	
08-Jul	3.39	3.41	3.41	96.62	95.25	83.06	2.93	2.51	3.41	
09-Jul	3.07	3.25	3.23	92.19	94.73	73.43	3.01	2.58	3.23	
10-Jul	3.06	3.18	3.08	82.69	90.50	66.51	3.05	2.64		
13-Jul	3.12	3.38	3.24	76.66	83.85	69.78	3.11	2.71		
14-Jul	3.25	3.43	3.26	76.37	78.57	70.18	3.17	2.77	3.26	
15-Jul	3.31	3.46	3.39	85.71	79.58	72.66	3.22	2.84	3.39	
16-Jul	3.16	3.41	3.33	86.64	82.91	69.77	3.25	2.90		
17-Jul	3.07	3.25	3.23	83.53	85.29	65.13	3.27	2.94		
20-Jul	3.08	3.21	3.12	70.97	80.38	60.37	3.25	2.98		
21-Jul	3.03	3.20	3.04	57.65	70.71	57.10	3.21	3.01		
22-Jul	2.89	2.90	2.89	33.33	53.98	51.47	3.18	3.03		
23-Jul	2.78	3.01	2.92	21.78	37.59	52.48	3.16	3.04		
24-Jul	2.94	3.15	3.04	19.61	24.91	56.38	3.14	3.06		
27-Jul	2.79	3.03	2.90	25.49	22.29	51.11	3.10	3.07		
28-Jul	2.75	2.88	2.77	19.57	21.55	46.73	3.03	3.08		
29-Jul	2.67	2.90	2.74	9.77	18.28	45.76	2.96	3.08		
30-Jul	2.65	2.99	2.84	11.71	13.68	49.53	2.92	3.08		
31-Jul	2.50	2.82	2.64	15.63	12.37	43.08	2.86	3.07		
03-Aug	2.61	2.78	2.66	18.24	15.19	43.86	2.82	3.05		
04-Aug	2.42	2.69	2.61	16.81	16.89	42.29	2.79	3.03		
05-Aug	2.68	2.85	2.75	25.21	20.09	47.93	2.77	3.00		
06-Aug	2.82	3.14	2.95	42.01	28.01	54.73	2.76	2.98		
07-Aug	2.93	3.05	2.99	59.97	42.40	55.97	2.77	2.97		
10-Aug	2.79	2.89	2.88	67.73	56.57	51.78	2.78	2.96		
11-Aug	2.70	2.91	2.73	59.52	62.41	46.64	2.78	2.94		
12-Aug	2.51	2.78	2.70	47.95	58.40	45.66	2.77	2.91		
13-Aug	2.67	2.97	2.77	43.14	50.20	48.38	2.78	2.88		
14-Aug	2.63	2.69	2.68	41.03	44.04	45.25	2.78	2.85		
17-Aug	2.49	2.61	2.52	32.87	39.01	40.26	2.77	2.82		
18-Aug	2.63	2.89	2.69	29.17	34.35	46.95	2.77	2.80		
19-Aug	2.71	3.01	2.82	35.65	32.56	51.43	2.75	2.79		
20-Aug	2.72	2.88	2.79	48.15	37.65	50.37	2.73	2.78		
21-Aug	2.78	3.07	2.92	58.80	47.53	54.72	2.74	2.78		
24-Aug	2.81	2.98	2.93	62.84	56.60	55.04	2.76	2.78		
25-Aug	2.98	3.20	3.07	72.94	64.86	59.44	2.80	2.78		
26-Aug	2.70	2.99	2.88	68.10	67.96	52.00	2.81	2.79		
27-Aug	2.53	2.75	2.72	56.34	65.79	46.70	2.82	2.79		
28-Aug	2.49	2.81	2.69	38.50	54.31	45.76	2.83	2.78		
31-Aug	2.44	2.76	2.60	27.21	40.68	42.96	2.82	2.78		
01-Sep	2.59	2.69	2.66	26.06	30.59	45.36	2.81	2.78		
02-Sep	2.45	2.61	2.55	21.49	24.92	41.88	2.78	2.78		
03-Sep	2.52	2.83	2.65	23.68	23.74	45.94	2.75	2.77		
04-Sep	2.60	2.81	2.80	29.82	25.00	51.42	2.74	2.76		
08-Sep	2.46	2.64	2.63	33.33	28.95	45.76	2.69	2.75		
09-Sep	2.58	2.62	2.58	30.26	31.14	44.22	2.65	2.73		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	2.44	2.59	2.58	20.61	28.07	44.22	2.64	2.73		
11-Sep	2.70	2.87	2.74	25.44	25.44	50.42	2.64	2.73		
14-Sep	2.72	2.77	2.73	32.02	26.02	50.04	2.66	2.73		
15-Sep	2.75	2.91	2.88	52.54	36.67	55.40	2.68	2.73		
16-Sep	2.84	3.09	2.94	65.03	49.86	57.36	2.73	2.75		
17-Sep	2.73	2.93	2.79	70.26	62.61	51.27	2.74	2.76		
18-Sep	2.62	2.91	2.78	61.03	65.44	50.89	2.74	2.76		
21-Sep	2.64	2.96	2.79	53.33	61.54	51.28	2.76	2.76		
22-Sep	2.76	3.00	2.83	55.38	56.58	52.92	2.78	2.75		
23-Sep	2.53	2.82	2.71	51.79	53.50	47.73	2.80	2.74		
24-Sep	2.50	2.69	2.51	37.44	48.21	40.59	2.77	2.72		
25-Sep	2.43	2.73	2.53	22.49	37.24	41.54	2.75	2.70		
28-Sep	2.58	2.76	2.70	22.28	27.40	48.95	2.73	2.70		
29-Sep	2.67	2.81	2.68	31.31	25.36	48.17	2.70	2.70		
30-Sep	2.55	2.72	2.69	39.39	30.99	48.61	2.69	2.70		
01-Oct	2.77	2.85	2.82	45.45	38.72	54.04	2.70	2.71		
02-Oct	2.60	2.79	2.69	45.96	43.60	48.52	2.68	2.72		
05-Oct	2.66	2.72	2.68	45.45	45.62	48.11	2.67	2.72		
06-Oct	2.67	2.92	2.75	44.47	45.30	51.20	2.67	2.72		
07-Oct	2.86	2.94	2.86	56.49	48.80	55.66	2.71	2.73		
08-Oct	3.04	3.08	3.06	76.17	59.04	62.40	2.77	2.75		
09-Oct	3.05	3.11	3.11	90.79	74.48	63.87	2.82	2.77		
12-Oct	2.80	3.04	2.92	89.66	85.54	55.03	2.84	2.78		
13-Oct	2.76	2.96	2.76	73.53	84.66	48.89	2.85	2.78		
14-Oct	2.80	2.98	2.83	59.80	74.33	51.44	2.85	2.78		
15-Oct	3.04	3.19	3.04	61.31	64.88	58.19	2.89	2.79		
16-Oct	2.91	3.19	3.00	68.57	63.23	56.57	2.93	2.80		
19-Oct	2.98	3.14	3.09	77.08	68.98	59.31	2.96	2.81		
20-Oct	3.00	3.15	3.08	78.68	74.78	58.86	2.99	2.83		
21-Oct	3.16	3.33	3.19	82.18	79.32	62.21	3.00	2.84		
22-Oct	3.10	3.28	3.17	79.43	80.10	61.23	3.01	2.86		
23-Oct	3.23	3.38	3.29	81.42	81.01	64.80	3.05	2.90		
26-Oct	3.07	3.16	3.11	73.30	78.05	56.42	3.09	2.93		
27-Oct	3.15	3.39	3.27	74.91	76.54	61.22	3.14	2.96		
28-Oct	3.21	3.32	3.30	74.37	74.19	62.06	3.17	2.99		
29-Oct	3.15	3.24	3.23	80.42	76.57	58.85	3.19	3.01		
30-Oct	2.99	3.30	3.11	71.96	75.58	53.70	3.19	3.03		
02-Nov	2.98	3.07	3.06	58.08	70.15	51.68	3.19	3.04		
03-Nov	3.22	3.36	3.22	54.74	61.59	57.24	3.20	3.07		
04-Nov	3.07	3.26	3.18	54.97	55.93	55.52	3.20	3.09		
05-Nov	3.28	3.39	3.36	71.17	60.29	61.17	3.20	3.11		
06-Nov	3.26	3.36	3.35	79.73	68.62	60.71	3.23	3.13		
09-Nov	3.46	3.73	3.55	86.31	79.07	66.20	3.26	3.15		
10-Nov	3.45	3.73	3.63	84.30	83.45	68.12	3.30	3.18		
11-Nov	3.51	3.61	3.52	78.22	82.94	62.84	3.33	3.22		
12-Nov	3.41	3.58	3.54	77.78	80.10	63.39	3.38	3.25		
13-Nov	3.44	3.59	3.47	70.67	75.56	60.01	3.42	3.27		
16-Nov	3.47	3.72	3.54	71.56	73.33	62.18	3.46	3.30		
17-Nov	3.41	3.53	3.53	71.11	71.11	61.67	3.50	3.32		
18-Nov	3.26	3.56	3.44	69.78	70.81	57.08	3.51	3.34		
19-Nov	3.17	3.48	3.32	60.00	66.96	51.57	3.50	3.34		
20-Nov	3.33	3.50	3.40	52.22	60.67	54.71	3.49	3.35		
23-Nov	3.27	3.58	3.43	49.96	54.06	55.86	3.47	3.36		
24-Nov	3.25	3.46	3.30	42.59	48.26	49.92	3.44	3.37		
25-Nov	3.37	3.67	3.48	44.37	45.64	56.78	3.43	3.38		
27-Nov	3.46	3.59	3.46	43.45	43.47	55.86	3.43	3.39		
30-Nov	3.11	3.41	3.31	46.47	44.76	49.43	3.41	3.39		
01-Dec	3.15	3.38	3.20	32.93	40.95	45.30	3.37	3.39		
02-Dec	3.12	3.41	3.29	25.51	34.97	49.05	3.35	3.41		
03-Dec	3.15	3.22	3.19	19.13	25.86	45.34	3.34	3.40		
04-Dec	3.21	3.46	3.29	24.04	22.89	49.46	3.33	3.41		
07-Dec	3.20	3.26	3.23	21.35	21.51	47.16	3.31	3.40		
08-Dec	3.20	3.24	3.24	24.72	23.37	47.60	3.30	3.40		
09-Dec	3.23	3.52	3.33	27.98	24.68	51.48	3.28	3.39		
10-Dec	3.11	3.13	3.13	22.02	24.91	43.72	3.25	3.36		
11-Dec	3.00	3.28	3.15	21.75	23.92	44.62	3.23	3.35		
14-Dec	2.96	3.08	3.01	11.00	18.26	39.82	3.21	3.32		

SAMPLE 10

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
03-Dec	2.77	2.85	2.83							
04-Dec	2.54	2.85	2.68							
05-Dec	2.62	2.78	2.67							
08-Dec	2.74	2.99	2.87							
09-Dec	2.93	3.04	3.04							
10-Dec	2.76	2.89	2.86							
11-Dec	2.77	2.93	2.88							
12-Dec	2.58	2.90	2.76							
15-Dec	2.73	2.88	2.83				2.82			
16-Dec	2.60	2.88	2.78				2.82			
17-Dec	2.47	2.82	2.67				2.82			
18-Dec	2.36	2.49	2.49				2.80			
19-Dec	2.54	2.66	2.59				2.77			
22-Dec	2.53	2.83	2.64				2.72			
23-Dec	2.48	2.69	2.61				2.69			
24-Dec	2.49	2.82	2.64	39.71		48.48	2.67			
26-Dec	2.71	2.93	2.82	48.53		55.08	2.67			
29-Dec	2.72	2.92	2.88	61.76	50.00	57.06	2.68			
30-Dec	2.78	2.84	2.78	72.60	60.96	52.88	2.68			
31-Dec	2.65	2.90	2.74	72.27	68.88	51.27	2.69			
02-Jan	2.55	2.82	2.67	64.91	69.93	48.48	2.71	2.75		
05-Jan	2.34	2.59	2.49	48.83	62.00	42.13	2.70	2.73		
06-Jan	2.33	2.63	2.46	33.83	49.19	41.16	2.68	2.72		
07-Jan	2.34	2.57	2.40	19.59	34.08	39.22	2.65	2.71		
08-Jan	2.50	2.70	2.57	24.44	25.95	46.86	2.65	2.70		
09-Jan	2.59	2.76	2.65	35.00	26.34	50.05	2.63	2.68		
12-Jan	2.81	2.84	2.82	58.33	39.26	56.07	2.62	2.67		
13-Jan	2.58	2.86	2.66	63.33	52.22	49.96	2.61	2.66		
14-Jan	2.68	2.95	2.84	72.97	64.88	55.80	2.62	2.67		
15-Jan	2.74	2.82	2.74	67.80	68.03	52.16	2.63	2.66		
16-Jan	2.75	2.94	2.93	81.72	74.16	57.79	2.67	2.67		
20-Jan	2.83	2.98	2.97	87.12	78.88	58.89	2.73	2.69		
21-Jan	2.72	2.81	2.77	87.64	85.49	51.66	2.77	2.70		
22-Jan	2.87	3.01	2.92	84.31	86.36	56.02	2.81	2.71		
23-Jan	2.66	2.76	2.75	72.07	81.34	50.46	2.82	2.72		
26-Jan	2.53	2.82	2.72	68.63	75.00	49.53	2.81	2.72		
27-Jan	2.49	2.67	2.67	56.12	65.61	47.94	2.81	2.73		
28-Jan	2.74	2.86	2.75	52.20	58.98	50.67	2.80	2.72		
29-Jan	2.53	2.81	2.70	46.55	51.62	48.94	2.80	2.71		
30-Jan	2.68	3.03	2.83	51.12	49.95	53.39	2.79	2.72		
02-Feb	2.92	3.11	2.93	58.11	51.92	56.53	2.78	2.73		
03-Feb	2.75	3.06	2.93	68.30	59.17	56.53	2.80	2.74		
04-Feb	2.86	3.08	2.95	72.04	66.15	57.20	2.80	2.76		
05-Feb	2.73	2.87	2.79	64.52	68.29	50.51	2.81	2.78		
06-Feb	2.56	2.77	2.72	53.23	63.26	47.87	2.81	2.79		
09-Feb	2.65	2.80	2.68	38.71	52.15	46.38	2.81	2.80		
10-Feb	2.53	2.65	2.62	29.57	40.50	44.15	2.79	2.79		
11-Feb	2.23	2.49	2.42	24.40	30.89	37.67	2.76	2.78		
12-Feb	2.10	2.38	2.24	18.81	24.26	32.98	2.70	2.76		
13-Feb	1.87	2.13	2.04	16.39	19.87	28.70	2.60	2.72		2.04
17-Feb	2.00	2.16	2.16	16.99	17.39	34.22	2.51	2.69		
18-Feb	1.91	2.08	2.08	18.01	17.13	32.42	2.42	2.65		
19-Feb	1.91	2.14	1.95	15.59	16.86	29.69	2.32	2.60		1.95
20-Feb	1.81	2.02	2.00	12.67	15.42	32.06	2.24	2.56		
23-Feb	2.01	2.35	2.17	16.47	14.91	39.53	2.19	2.53		
24-Feb	2.09	2.34	2.14	22.98	17.37	38.72	2.13	2.50		
25-Feb	2.16	2.28	2.19	30.06	23.17	40.89	2.11	2.47		
26-Feb	2.17	2.26	2.19	33.41	28.82	40.89	2.10	2.45		
27-Feb	2.14	2.42	2.29	40.91	34.79	45.38	2.13	2.43		
02-Mar	2.13	2.26	2.17	43.24	39.18	41.32	2.13	2.40		
03-Mar	1.95	2.14	2.03	41.23	41.79	37.15	2.13	2.37		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
04-Mar	2.00	2.18	2.09	40.37	41.61	39.95	2.14	2.33		
05-Mar	2.19	2.32	2.21	47.94	43.18	45.20	2.16	2.29		
06-Mar	2.03	2.20	2.04	49.73	46.01	39.88	2.15	2.25		
09-Mar	1.90	2.09	1.94	41.53	46.40	37.11	2.13	2.21		
10-Mar	1.83	1.97	1.92	25.68	38.98	36.56	2.10	2.17		
11-Mar	2.05	2.22	2.10	28.96	32.06	44.49	2.09	2.14		
12-Mar	1.93	2.19	2.00	31.46	28.70	41.40	2.06	2.11		
13-Mar	1.75	2.02	1.88	31.92	30.78	37.98	2.02	2.09		
16-Mar	1.93	2.23	2.03	30.00	31.13	44.18	2.02	2.08		
17-Mar	2.08	2.16	2.16	40.80	34.24	48.94	2.03	2.08		
18-Mar	1.95	2.07	2.03	48.26	39.69	44.82	2.01	2.08		
19-Mar	1.67	1.88	1.84	43.05	44.03	39.58	1.99	2.07		
20-Mar	1.66	1.89	1.82	30.73	40.68	39.06	1.98	2.06		
23-Mar	1.54	1.78	1.71	24.06	32.61	36.25	1.95	2.05		
24-Mar	1.41	1.60	1.53	19.74	24.84	32.18	1.89	2.01		
25-Mar	1.38	1.60	1.52	17.15	20.32	31.96	1.84	1.99		
26-Mar	1.50	1.62	1.54	16.16	17.68	32.93	1.80	1.95		
27-Mar	1.65	1.77	1.73	25.49	19.60	41.43	1.76	1.93		
30-Mar	1.57	1.68	1.63	29.80	23.82	38.65	1.71	1.90		
31-Mar	1.47	1.69	1.57	30.98	28.76	37.05	1.65	1.87		
01-Apr	1.36	1.60	1.55	24.53	28.44	36.50	1.62	1.85		
02-Apr	1.32	1.65	1.51	21.69	25.74	35.38	1.59	1.82		
03-Apr	1.34	1.60	1.40	17.41	21.21	32.44	1.55	1.78		
06-Apr	1.13	1.38	1.21	12.97	17.36	28.09	1.52	1.74		1.21
07-Apr	1.14	1.52	1.34	15.22	15.20	34.56	1.50	1.72		
08-Apr	1.29	1.64	1.47	26.96	18.38	40.33	1.49	1.69		
09-Apr	1.51	1.70	1.59	47.71	29.96	45.15	1.47	1.67		
13-Apr	1.43	1.59	1.55	60.38	45.02	43.88	1.47	1.65		
14-Apr	1.57	1.88	1.75	73.02	60.37	51.26	1.49	1.64		
15-Apr	1.54	1.91	1.74	75.50	69.63	50.90	1.51	1.63		
16-Apr	1.75	1.87	1.87	85.25	77.92	55.31	1.55	1.61		
17-Apr	2.01	2.06	2.01	89.23	83.33	59.52	1.61	1.61		
20-Apr	1.92	2.23	2.09	92.26	88.91	61.74	1.71	1.63		
21-Apr	2.11	2.17	2.11	90.33	90.61	62.29	1.80	1.64		
22-Apr	2.13	2.35	2.16	86.93	89.84	63.71	1.87	1.66		
23-Apr	2.27	2.42	2.32	88.59	88.62	67.88	1.96	1.70		
24-Apr	2.11	2.21	2.15	85.25	86.92	59.99	2.02	1.73		
27-Apr	1.95	2.18	2.04	80.54	84.79	55.50	2.05	1.75		
28-Apr	2.23	2.43	2.24	77.57	81.12	61.19	2.11	1.78		
29-Apr	2.24	2.47	2.35	80.70	79.61	63.93	2.16	1.81		
30-Apr	2.12	2.39	2.19	81.62	79.97	57.57	2.18	1.84		
01-May	2.19	2.43	2.35	82.88	81.73	61.67	2.21	1.88		
04-May	2.32	2.39	2.36	82.78	82.43	61.92	2.24	1.92		
05-May	2.22	2.56	2.38	84.35	83.34	62.45	2.26	1.97		
06-May	2.35	2.47	2.45	82.92	83.35	64.29	2.28	2.02		
07-May	2.51	2.53	2.53	85.30	84.19	66.33	2.32	2.08		
08-May	2.37	2.70	2.51	84.26	84.16	65.33	2.37	2.13		
11-May	2.24	2.50	2.35	74.44	81.33	57.79	2.39	2.17		
12-May	2.44	2.69	2.51	67.56	75.42	62.46	2.40	2.21		
13-May	2.34	2.38	2.36	60.89	67.63	56.19	2.42	2.24		
14-May	2.09	2.27	2.22	55.11	61.19	51.04	2.41	2.26		
15-May	1.96	2.24	2.04	33.83	49.94	45.29	2.37	2.27		
18-May	2.00	2.20	2.04	19.21	36.05	45.29	2.33	2.27		
19-May	1.98	2.33	2.13	14.86	22.63	48.64	2.30	2.28		
20-May	2.06	2.37	2.20	22.07	18.71	51.15	2.26	2.28		
21-May	2.12	2.31	2.31	34.23	23.72	54.88	2.24	2.29		
22-May	2.33	2.40	2.40	46.40	34.23	57.72	2.25	2.29		
26-May	2.48	2.73	2.55	61.13	47.25	62.02	2.25	2.31		
27-May	2.35	2.50	2.46	67.01	58.18	58.20	2.26	2.33		
28-May	2.34	2.67	2.52	71.43	66.52	59.97	2.29	2.34		
29-May	2.61	2.77	2.68	75.52	71.32	64.31	2.37	2.36		
01-Jun	2.73	2.88	2.87	86.84	77.93	68.66	2.46	2.39		
02-Jun	2.99	3.13	3.06	93.94	85.43	72.29	2.56	2.43	3.06	
03-Jun	2.86	3.16	2.99	92.92	91.23	69.11	2.65	2.46		
04-Jun	2.95	3.16	3.00	88.84	91.90	69.32	2.73	2.48		
05-Jun	3.05	3.28	3.17	88.01	89.92	72.68	2.81	2.52	3.17	

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
08-Jun	2.93	3.24	3.05	86.84	87.90	67.09	2.87	2.54		
09-Jun	3.08	3.26	3.17	88.28	87.71	69.61	2.95	2.58		
10-Jun	3.03	3.19	3.03	83.91	86.34	63.51	3.00	2.61		
11-Jun	3.22	3.26	3.23	88.06	86.75	67.84	3.06	2.64		
12-Jun	3.40	3.56	3.41	86.96	86.31	71.17	3.12	2.69	3.41	
15-Jun	3.39	3.66	3.52	90.61	88.54	73.00	3.17	2.75	3.52	
16-Jun	3.38	3.60	3.45	87.06	88.21	69.95	3.23	2.82		
17-Jun	3.38	3.71	3.54	86.01	87.90	71.59	3.29	2.89	3.54	
18-Jun	3.44	3.76	3.64	85.66	86.25	73.34	3.34	2.96	3.64	
19-Jun	3.56	3.78	3.73	89.15	86.94	74.84	3.41	3.04	3.73	
22-Jun	3.53	3.80	3.72	91.47	88.76	74.34	3.47	3.10	3.72	
23-Jun	3.52	3.70	3.60	87.69	89.44	68.43	3.54	3.16		
24-Jun	3.62	3.76	3.72	86.44	88.53	70.92	3.59	3.22	3.72	
25-Jun	3.37	3.73	3.53	78.93	84.35	62.52	3.61	3.27		
26-Jun	3.54	3.68	3.58	77.07	80.81	63.73	3.61	3.32		
29-Jun	3.42	3.73	3.61	71.91	75.97	64.48	3.63	3.36		
30-Jun	3.36	3.72	3.54	67.31	72.09	61.31	3.63	3.39		
01-Jul	3.46	3.63	3.61	62.44	67.22	63.26	3.63	3.42		
02-Jul	3.33	3.72	3.53	51.51	60.42	59.57	3.60	3.45		
06-Jul	3.71	3.75	3.73	61.49	58.48	65.05	3.61	3.48		
07-Jul	3.47	3.70	3.57	59.57	57.53	58.25	3.60	3.50		
08-Jul	3.37	3.50	3.37	48.23	56.43	51.06	3.56	3.52		
09-Jul	3.08	3.31	3.21	25.88	44.56	46.15	3.53	3.52		
10-Jul	2.99	3.13	3.06	11.74	28.61	42.07	3.47	3.52		
13-Jul	2.83	3.08	2.98	14.28	17.30	40.04	3.40	3.51		
14-Jul	3.06	3.24	3.17	20.44	15.48	46.64	3.36	3.50		
15-Jul	3.15	3.23	3.15	29.16	21.29	46.06	3.31	3.48		
16-Jul	2.94	3.24	3.09	33.20	27.60	44.30	3.26	3.46		
17-Jul	2.78	3.14	2.98	27.89	30.08	41.19	3.18	3.43		
20-Jul	2.93	3.11	2.95	22.14	27.74	40.35	3.11	3.40		
21-Jul	3.09	3.16	3.14	25.09	25.04	47.58	3.08	3.37		
22-Jul	3.12	3.23	3.14	30.58	25.94	47.58	3.07	3.35		
23-Jul	2.96	3.16	3.07	34.71	30.13	45.24	3.07	3.32		
24-Jul	3.01	3.27	3.21	37.92	34.40	50.49	3.10	3.30		
27-Jul	3.17	3.31	3.28	48.69	40.44	52.92	3.11	3.28		
28-Jul	3.22	3.37	3.31	68.67	51.76	53.96	3.13	3.27		
29-Jul	3.01	3.19	3.15	74.00	63.79	47.87	3.14	3.25		
30-Jul	3.08	3.11	3.10	68.93	70.53	46.12	3.15	3.23		
31-Jul	2.94	3.26	3.13	58.76	67.23	47.36	3.17	3.21		
03-Aug	3.08	3.25	3.08	54.80	60.83	45.48	3.16	3.18		
04-Aug	2.94	3.12	2.99	48.59	54.05	42.22	3.15	3.15		
05-Aug	2.82	2.98	2.88	34.46	45.95	38.58	3.13	3.12		
06-Aug	2.69	2.90	2.73	19.47	34.18	34.25	3.07	3.09		
07-Aug	2.45	2.69	2.65	14.86	22.93	32.17	3.00	3.06		
10-Aug	2.49	2.65	2.56	13.19	15.84	29.97	2.92	3.04		2.56
11-Aug	2.60	2.76	2.70	20.29	16.11	37.17	2.87	3.02		
12-Aug	2.85	2.98	2.88	28.62	20.70	45.00	2.84	3.01		
13-Aug	2.90	3.05	2.91	41.30	30.07	46.20	2.82	3.00		
14-Aug	3.05	3.21	3.09	55.43	41.79	52.87	2.82	3.00		
17-Aug	3.03	3.15	3.11	67.02	54.58	53.56	2.83	3.00		
18-Aug	2.92	3.05	3.02	73.81	65.42	50.02	2.85	3.01		
19-Aug	2.65	2.98	2.82	65.84	68.89	43.18	2.86	2.99		
20-Aug	2.65	2.84	2.65	47.02	62.22	38.39	2.86	2.97		
21-Aug	2.44	2.57	2.56	28.75	47.20	36.10	2.86	2.94		
24-Aug	2.45	2.76	2.62	21.32	32.36	38.72	2.85	2.92		
25-Aug	2.75	2.78	2.77	27.27	25.78	44.81	2.84	2.89		
26-Aug	2.73	2.98	2.80	37.66	28.75	45.97	2.83	2.87		
27-Aug	2.65	2.76	2.74	42.86	35.93	43.99	2.79	2.85		
28-Aug	2.58	2.87	2.78	43.29	41.27	45.67	2.75	2.83		
31-Aug	2.67	2.93	2.76	41.56	42.57	44.94	2.72	2.81		
01-Sep	2.79	2.93	2.85	46.32	43.72	48.89	2.73	2.80		
02-Sep	2.86	3.06	2.99	55.41	47.76	54.38	2.76	2.80		
03-Sep	2.96	3.28	3.13	68.94	56.89	59.10	2.83	2.82		
04-Sep	2.82	3.11	3.00	73.41	65.92	53.55	2.87	2.83		
08-Sep	2.72	2.86	2.86	66.27	69.54	48.30	2.88	2.84		
09-Sep	2.54	2.77	2.67	48.02	62.57	42.24	2.86	2.84		

Date	Low ($/bu)	High ($/bu)	Close ($/bu)	Stochastics		RSI	Moving averages		Sell ($/bu)	Buy ($/bu)
							9-day	21-day		
10-Sep	2.68	2.77	2.76	38.49	50.93	45.71	2.87	2.85		
11-Sep	2.88	2.96	2.90	39.90	42.14	50.68	2.88	2.85		
14-Sep	2.74	2.92	2.90	46.99	41.79	50.68	2.90	2.85		
15-Sep	3.05	3.21	3.07	58.16	48.35	56.31	2.92	2.85		
16-Sep	2.73	3.10	2.92	57.21	54.12	50.80	2.91	2.84		
17-Sep	2.81	3.05	2.99	61.26	58.88	53.11	2.90	2.84		
18-Sep	2.75	3.04	2.84	50.90	56.46	47.92	2.88	2.84		
21-Sep	2.67	2.84	2.70	40.99	51.05	43.64	2.86	2.84		
22-Sep	2.58	2.69	2.68	27.03	39.64	43.05	2.86	2.84		
23-Sep	2.59	2.65	2.64	18.02	28.68	41.83	2.85	2.85		
24-Sep	2.55	2.79	2.64	15.79	20.28	41.83	2.82	2.84		
25-Sep	2.55	2.91	2.74	19.43	17.74	46.25	2.80	2.84		
28-Sep	2.58	2.79	2.78	26.87	20.69	47.95	2.77	2.84		
29-Sep	2.62	2.73	2.65	26.94	24.41	43.16	2.74	2.83		
30-Sep	2.62	2.81	2.79	29.11	27.64	49.07	2.72	2.83		
01-Oct	2.86	3.11	2.98	38.89	31.65	55.78	2.73	2.84		
02-Oct	2.85	2.90	2.87	50.00	39.33	51.54	2.75	2.83		
05-Oct	2.89	2.96	2.89	58.12	49.00	52.25	2.78	2.82		
06-Oct	2.56	2.77	2.76	48.90	52.34	47.39	2.79	2.81		
07-Oct	2.58	2.78	2.71	42.26	49.76	45.63	2.80	2.80		
08-Oct	2.50	2.70	2.61	28.03	39.73	42.26	2.78	2.80		
09-Oct	2.36	2.71	2.55	23.98	31.43	40.33	2.76	2.79		
12-Oct	2.72	2.88	2.75	31.79	27.93	48.73	2.77	2.78		
13-Oct	2.70	2.77	2.74	42.67	32.81	48.36	2.76	2.78		
14-Oct	2.47	2.85	2.66	47.56	40.67	45.42	2.73	2.76		
15-Oct	2.58	2.97	2.77	48.44	46.22	49.93	2.72	2.75		
16-Oct	2.57	2.61	2.58	41.33	45.78	43.28	2.68	2.73		
19-Oct	2.60	2.69	2.66	41.33	43.70	46.51	2.67	2.72		
20-Oct	2.72	2.87	2.72	39.11	40.59	48.86	2.67	2.72		
21-Oct	2.49	2.55	2.52	38.08	39.51	42.20	2.66	2.71		
22-Oct	2.56	2.80	2.68	42.23	39.81	48.28	2.68	2.72		
23-Oct	2.49	2.75	2.67	43.17	41.16	47.94	2.67	2.72		
26-Oct	2.55	2.68	2.58	46.45	43.95	44.88	2.65	2.71		
27-Oct	2.60	2.87	2.68	46.45	45.36	48.79	2.65	2.71		
28-Oct	2.66	2.91	2.73	49.73	47.54	50.67	2.65	2.71		
29-Oct	2.40	2.66	2.54	45.89	47.36	44.04	2.64	2.70		
30-Oct	2.52	2.65	2.58	38.93	44.85	45.65	2.63	2.68		
02-Nov	2.60	2.86	2.70	36.26	40.36	50.28	2.63	2.67		
03-Nov	2.64	2.85	2.73	47.37	40.85	51.39	2.65	2.66		
04-Nov	2.68	2.87	2.86	66.91	50.18	56.00	2.67	2.67		
05-Nov	2.65	2.87	2.82	76.81	63.70	54.29	2.69	2.67		
06-Nov	2.85	3.19	2.99	82.41	75.38	59.88	2.74	2.69		
09-Nov	2.86	3.12	3.00	77.66	78.96	60.19	2.77	2.71		
10-Nov	2.95	3.23	3.11	78.73	79.60	63.51	2.81	2.73		
11-Nov	2.95	3.18	3.12	82.75	79.71	63.80	2.88	2.75		
12-Nov	2.94	3.12	3.09	85.14	82.20	62.18	2.94	2.77		
13-Nov	3.15	3.36	3.18	83.71	83.87	65.05	2.99	2.79		
16-Nov	2.92	3.17	3.04	77.02	81.96	57.70	3.02	2.81		
17-Nov	2.94	3.23	3.05	71.87	77.53	58.06	3.04	2.83		
18-Nov	2.97	3.17	3.09	67.41	72.10	59.56	3.07	2.85		
19-Nov	3.02	3.26	3.10	67.12	68.80	59.95	3.09	2.87		
20-Nov	2.85	3.06	3.00	61.22	65.25	54.36	3.09	2.89		
23-Nov	2.79	2.85	2.83	47.05	58.46	46.43	3.06	2.90		
24-Nov	2.74	2.95	2.87	35.45	47.90	48.34	3.03	2.91		
25-Nov	2.80	2.98	2.93	28.99	37.16	51.15	3.01	2.92		
27-Nov	3.10	3.14	3.13	41.51	35.32	59.14	3.00	2.94		
30-Nov	3.15	3.40	3.21	54.92	41.81	61.83	3.02	2.97		
01-Dec	3.15	3.31	3.27	71.47	55.97	63.75	3.05	3.01		
02-Dec	3.16	3.40	3.31	79.29	68.56	65.02	3.07	3.03		
03-Dec	3.32	3.61	3.46	83.14	77.97	69.35	3.11	3.07		
04-Dec	3.40	3.53	3.42	82.43	81.62	66.97	3.16	3.10		
07-Dec	3.36	3.54	3.39	78.54	81.37	65.16	3.22	3.12		
08-Dec	3.25	3.40	3.25	70.50	77.16	57.39	3.26	3.14		
09-Dec	3.24	3.51	3.40	69.73	72.92	62.54	3.32	3.15		
10-Dec	3.35	3.56	3.52	74.71	71.65	66.08	3.36	3.17		
11-Dec	3.58	3.90	3.70	82.76	75.73	70.57	3.41	3.20	3.70	
14-Dec	3.58	3.72	3.58	81.61	79.69	64.45	3.45	3.23		

APPENDIX VI

APPLICATION OF METHODOLOGY ON SAMPLES 1 – 10

SAMPLE 1

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$2.29	Buy	Put	22.21%	$2.20	-$0.11	$2.09
CORN	04/30	$2.29	Buy	Put	22.21%	$1.80	-$0.01	$2.08
CORN	04/30	$2.29	Sell	Call	22.21%	$2.60	$0.05	$2.13
CORN	05/01	$2.20	Sell	Put	22.21%	$1.80	$0.03	$2.16
CORN	05/01	$2.20	Sell	Put	22.21%	$1.80	$0.03	$2.19
CORN	05/01	$2.20	Buy	Call	26.48%	$2.60	-$0.05	$2.14
CORN	07/22	$3.00	Sell	Put	32.29%	$2.20	$0.01	$2.15
CORN	07/22	$3.00	Buy	Put	32.29%	$3.00	-$0.22	$2.73
CORN	07/22	$3.00	Buy	Put	32.29%	$1.80	$0.00	$2.73
CORN	07/28	$3.32	Sell	Put	32.29%	$3.00	$0.10	$2.83
CORN	07/28	$3.32	Buy	Put	32.29%	$3.40	-$0.22	$3.01
CORN	09/02	$4.08	Sell	Put	30.10%	$3.40	$0.02	$3.03
CORN	09/02	$4.08	Buy	Put	30.10%	$4.00	-$0.19	$3.44
CORN	11/19	$4.85	Sell	Put	23.60%	$4.00	$0.00	$3.44
CORN	11/19	$4.85	Buy	Put	23.60%	$4.80	-$0.01	$4.23
								$4.23

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$2.29	Buy	Call	22.21%	$2.20	$0.20	$2.40
CORN	04/30	$2.29	Buy	Call	22.21%	$2.60	$0.05	$2.45
		$1.80 put option bought due to insufficient premium						
CORN	04/30	$2.29	Buy	Put	22.21%	$1.80	$0.01	$2.46
CORN	05/01	$2.20	Sell	Put	22.21%	$1.80	-$0.03	$2.43
CORN	07/22	$3.00	Sell	Call	32.29%	$2.60	-$0.47	$1.96
CORN	07/22	$3.00	Sell	Call	32.29%	$3.60	-$0.05	$1.91
DELTA:								
CORN	07/30	$3.65	Buy	Future			$3.65	
CORN	07/31	$3.49	Sell	Future			$3.49	$0.16
CORN	08/26	$3.76	Buy	Future			$3.76	
CORN	08/27	$3.58	Sell	Future			$3.58	$0.18
CORN	08/28	$3.70	Buy	Future			$3.70	$0.10
								$2.35

SAMPLE 2

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$1.83	Buy	Put	22.21%	$1.80	-$0.11	$1.69
CORN	04/30	$1.83	Buy	Put	22.21%	$1.40	-$0.01	$1.68
CORN	04/30	$1.83	Sell	Call	22.21%	$2.20	$0.02	$1.70
		$1.80 put option not sold due to insufficient premium						
CORN	09/25	$2.92	Buy	Put	30.10%	$3.00	-$0.18	$2.72
		$3.00 put option not sold due to insufficient premium						
CORN	10/29	$3.60	Buy	Put	29.05%	$3.60	-$0.10	$3.22
		$3.60 put option not sold due to insufficient premium						
CORN	11/12	$4.02	Buy	Put	23.60%	$4.00	-$0.05	$3.57
DELTA:								
CORN	08/31	$2.29	Buy	Future			$2.29	
CORN	09/02	$2.18	Sell	Future			$2.18	-$0.11
CORN	09/03	$2.34	Buy	Future			$2.34	
CORN	09/11	$2.16	Sell	Future			$2.16	-$0.18
CORN	09/16	$2.34	Buy	Future			$2.34	-$0.14
								$3.14

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	03/12	$1.66	Buy	Call	25.22%	$1.60	$0.17	$1.77
CORN	03/12	$1.66	Buy	Call	25.22%	$2.00	$0.04	$1.81
		$1.80 put option bought due to insufficient premium						
CORN	03/12	$1.66	Buy	Put	25.22%	$1.20	$0.01	$1.82
CORN	03/18	$1.35	Sell	Call	25.22%	$1.60	-$0.04	$1.78
CORN	03/18	$1.35	Buy	Call	25.22%	$1.40	$0.09	$1.67
CORN	03/18	$1.35	Sell	Put	25.22%	$1.20	-$0.05	$1.62
CORN	09/25	$2.92	Sell	Call	30.10%	$2.00	-$0.92	**$0.70**

SAMPLE 3

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	03/13	$4.38	Buy	Put	25.22%	$4.40	-$0.38	$4.02
CORN	03/13	$4.38	Buy	Put	25.22%	$3.60	-$0.08	$3.94
CORN	03/13	$4.38	Sell	Call	25.22%	$5.20	$0.12	$4.06
CORN	05/14	$4.95	Sell	Put	26.48%	$4.40	$0.15	$4.21
CORN	05/14	$4.95	Buy	Put	26.48%	$5.00	-$0.40	$4.41
CORN	05/22	$5.50	Sell	Put	26.48%	$5.00	$0.19	$4.60
CORN	05/22	$5.50	Buy	Put	26.48%	$5.60	-$0.47	$4.73
CORN	10/06	$3.76	Sell	Put	29.05%	$3.60	$0.08	$4.81
$3.00 put option not sold due to insufficient premium								
CORN	10/06	$3.76	Buy	Call	29.05%	$5.20	$0.00	$4.81
DELTA:								
CORN	05/21	$5.30	Buy	Future			$5.30	
CORN	06/10	$5.18	Sell	Future			$5.18	-$0.12
CORN	08/31	$5.22	Buy	Future			$5.22	
CORN	09/03	$5.04	Sell	Future			$5.04	-$0.18
								$4.51

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$4.31	Buy	Call	22.21%	$4.40	$0.25	$4.65
CORN	04/30	$4.31	Buy	Call	22.21%	$5.20	$0.05	$4.70
CORN	04/30	$4.31	Sell	Put	22.21%	$3.60	-$0.05	$4.65
CORN	05/14	$4.95	Buy	Put	26.48%	$3.60	$0.02	$4.67
CORN	05/14	$4.95	Sell	Call	26.48%	$5.20	-$0.27	$4.40
CORN	05/14	$4.95	Sell	Call	26.48%	$6.00	-$0.09	$4.31
CORN	10/06	$3.76	Buy	Call	29.05%	$6.00	$0.00	$4.31
$4.40 call option not sold due to insufficient premium								
CORN	10/06	$3.76	Buy	Call	29.05%	$3.80	$0.13	$3.84
CORN	11/10	$5.15	Sell	Call	23.60%	$4.40	-$0.75	**$3.09**

SAMPLE 4

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$2.24	Buy	Put	22.21%	$2.20	-$0.13	$2.07
CORN	04/30	$2.24	Buy	Put	22.21%	$1.80	-$0.01	$2.06
CORN	04/30	$2.24	Sell	Call	22.21%	$2.60	$0.04	$2.10
CORN	05/19	$3.02	Sell	Put	26.48%	$2.20	$0.01	$2.11
CORN	05/19	$3.02	Buy	Put	26.48%	$3.00	-$0.22	$2.69
CORN	05/21	$3.32	Sell	Put	26.48%	$3.00	$0.11	$2.80
CORN	05/21	$3.32	Buy	Put	26.48%	$3.40	-$0.29	$2.91
CORN	07/31	$2.29	Sell	Put	32.29%	$1.80	$0.01	$2.92
$1.80 put option not sold due to insufficient premium								
CORN	07/31	$2.29	Buy	Call	32.29%	$2.60	-$0.06	$2.86
DELTA:								
CORN	05/15	$2.76	Buy	Future			$2.76	
CORN	07/29	$2.55	Sell	Future			$2.55	-$0.21
								$2.65

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	03/06	$2.39	Buy	Call	25.22%	$2.40	$0.20	$2.60
CORN	03/06	$2.39	Buy	Call	25.22%	$2.80	$0.07	$2.67
CORN	03/06	$2.39	Sell	Put	25.22%	$2.00	-$0.05	$2.62
CORN	03/19	$1.95	Sell	Call	25.22%	$2.40	-$0.04	$2.58
CORN	03/19	$1.95	Buy	Call	25.22%	$2.00	$0.14	$2.32
CORN	03/25	$1.64	Sell	Call	25.22%	$2.00	-$0.03	$2.29
CORN	03/25	$1.64	Buy	Call	25.22%	$1.60	$0.15	$2.04
CORN	05/19	$3.02	Sell	Call	26.48%	$2.80	-$0.35	$1.69
CORN	05/19	$3.02	Sell	Call	26.48%	$3.60	-$0.06	$1.63
CORN	05/19	$3.02	Buy	Put	26.48%	$2.00	$0.00	$1.63
CORN	07/31	$2.29	Buy	Call	32.29%	$3.60	$0.00	$1.63
$1.60 call option not sold due to insufficient premium								
CORN	08/24	$1.27	Buy	Call	26.83%	$1.20	$0.11	$1.74
CORN	11/20	$2.89	Exercise	Call		$1.60	-$1.29	**$0.45**

SAMPLE 5

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/17	$3.48	Buy	Put	22.21%	$3.40	-$0.20	$3.20
CORN	04/17	$3.48	Buy	Put	22.21%	$2.80	-$0.03	$3.17
CORN	04/17	$3.48	Sell	Call	22.21%	$4.00	$0.07	$3.24
CORN	04/28	$3.74	Sell	Put	22.21%	$3.40	$0.10	$3.34
CORN	04/28	$3.74	Buy	Put	22.21%	$3.80	-$0.28	$3.46
CORN	07/07	$2.91	Sell	Put	32.29%	$2.80	$0.17	$3.63
CORN	07/07	$2.91	Sell	Put	32.29%	$2.40	-$0.05	$3.58
CORN	07/07	$2.91	Buy	Call	32.29%	$4.00	-$0.02	$3.56
CORN	09/23	$3.77	Buy	Put	30.10%	$2.40	$0.00	$3.56
DELTA:								
CORN	05/07	$4.05	Buy	Future			$4.05	
CORN	05/08	$3.92	Sell	Future			$3.92	-$0.13
								$3.43

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	01/02	$1.63	Buy	Call	25.89%	$1.60	$0.17	$1.77
CORN	01/02	$1.63	Buy	Call	25.89%	$2.00	$0.05	$1.82
CORN	01/02	$1.63	Sell	Put	25.89%	$1.20	-$0.02	$1.80
CORN	04/17	$3.48	Sell	Call	22.21%	$2.00	-$1.48	$0.52
CORN	04/17	$3.48	Sell	Call	22.21%	$4.20	-$0.05	$0.47
CORN	04/17	$3.48	Buy	Put	22.21%	$1.20	$0.00	$0.47
CORN	07/07	$2.91	Buy	Call	32.29%	$4.20	$0.01	**$0.48**

SAMPLE 6

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$3.44	Buy	Put	22.21%	$3.40	-$0.21	$3.19
CORN	04/30	$3.44	Buy	Put	22.21%	$2.80	-$0.03	$3.16
CORN	04/30	$3.44	Sell	Call	22.21%	$4.00	$0.06	$3.22
CORN	06/16	$2.47	Sell	Put	29.24%	$2.80	$0.41	$3.63
CORN	06/16	$2.47	Sell	Put	29.24%	$2.00	$0.03	$3.66
CORN	06/16	$2.47	Buy	Call	29.24%	$4.00	$0.00	$3.66
CORN	09/24	$3.99	Sell	Put	30.10%	$3.40	$0.02	$3.68
CORN	09/24	$3.99	Buy	Put	30.10%	$4.00	-$0.19	$4.09
CORN	09/24	$3.99	Buy	Put	30.10%	$2.00	$0.00	$4.09
11/20	Expire	$4.36						**$4.45**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$3.44	Buy	Call	22.21%	$3.40	$0.25	$3.65
CORN	04/30	$3.44	Buy	Call	22.21%	$4.00	$0.06	$3.71
CORN	04/30	$3.44	Sell	Put	22.21%	$2.80	-$0.03	$3.68
CORN	06/16	$2.47	Sell	Call	29.24%	$3.40	-$0.01	$3.67
CORN	06/16	$2.47	Buy	Call	29.24%	$2.40	$0.22	$2.89
CORN	09/24	$3.99	Sell	Call	30.10%	$4.00	-$0.18	$2.71
		$4.80 call option not sold due to insufficient premium						
CORN	09/24	$3.99	Buy	Put	30.10%	$2.80	$0.00	$2.71
DELTA:								
CORN	06/09	$2.77	Sell	Future			$2.77	
CORN	06/10	$2.85	Buy	Future			$2.85	$0.08
CORN	06/12	$2.76	Sell	Future			$2.76	
CORN	06/26	$2.86	Buy	Future			$2.86	$0.10
CORN	06/29	$2.74	Sell	Future			$2.74	
CORN	06/30	$2.92	Buy	Future			$2.92	$0.18
CORN	08/07	$2.73	Sell	Future			$2.73	
CORN	08/12	$2.85	Buy	Future			$2.85	$0.12
								$3.19

SAMPLE 7

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/02	$3.74	Buy	Put	22.21%	$3.80	-$0.30	$3.50
CORN	04/02	$3.74	Buy	Put	22.21%	$3.00	-$0.03	$3.47
CORN	04/02	$3.74	Sell	Call	22.21%	$4.60	$0.04	$3.51
CORN	07/24	$1.68	Sell	Put	32.29%	$3.00	$1.32	$4.83
CORN	07/24	$1.68	Sell	Put	32.29%	$1.40	$0.02	$4.85
CORN	07/24	$1.68	Buy	Call	32.29%	$4.60	$0.00	$4.85
CORN	10/16	$3.10	Buy	Put	29.05%	$1.40	$0.00	**$4.85**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	01/30	$2.36	Buy	Call	25.89%	$2.40	$0.20	$2.60
CORN	01/30	$2.36	Buy	Call	25.89%	$2.80	$0.08	$2.68
CORN	01/30	$2.36	Sell	Put	25.89%	$2.00	-$0.07	$2.61
CORN	04/02	$3.74	Sell	Call	22.21%	$2.80	-$0.95	$1.66
CORN	04/02	$3.74	Sell	Call	22.21%	$4.40	-$0.07	$1.59
CORN	04/02	$3.74	Buy	Put	22.21%	$2.00	$0.00	$1.59
CORN	06/26	$2.41	Buy	Call	29.24%	$4.40	$0.00	$1.59
CORN	07/09	$2.11	Sell	Call	32.29%	$2.40	-$0.07	$1.52
CORN	07/09	$2.11	Buy	Call	32.29%	$2.20	$0.13	$1.45
CORN	07/15	$1.95	Sell	Call	32.29%	$2.20	-$0.06	$1.39
CORN	07/15	$1.95	Buy	Call	32.29%	$2.00	$0.13	$1.32
CORN	07/24	$1.68	Sell	Call	32.29%	$2.00	-$0.03	$1.29
CORN	07/24	$1.68	Buy	Call	32.29%	$1.60	$0.16	$1.05
CORN	07/31	$1.40	Sell	Call	32.29%	$1.60	-$0.04	$1.01
CORN	07/31	$1.40	Buy	Call	32.29%	$1.40	$0.10	**$0.91**

SAMPLE 8

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$3.56	Buy	Put	22.21%	$3.60	-$0.26	$3.34
CORN	04/30	$3.56	Buy	Put	22.21%	$2.80	-$0.02	$3.32
CORN	04/30	$3.56	Sell	Call	22.21%	$4.20	$0.05	$3.37
CORN	05/15	$4.48	Sell	Put	26.48%	$3.60	$0.05	$3.42
CORN	05/15	$4.48	Buy	Put	26.48%	$4.40	-$0.30	$3.92
CORN	06/10	$4.94	Sell	Put	29.24%	$4.40	$0.16	$4.08
CORN	06/10	$4.94	Buy	Put	29.24%	$5.00	-$0.42	$4.26
CORN	07/24	$3.86	Buy	Call	32.29%	$4.20	-$0.16	$4.10
$2.80 put option not sold due to insufficient premium								
CORN	07/27	$3.66	Sell	Put	32.29%	$2.80	$0.02	$4.12
CORN	07/27	$3.66	Sell	Put	32.29%	$3.00	$0.04	$4.16
DELTA:								
CORN	05/14	$4.34	Buy	Future			$4.34	
CORN	07/21	$4.08	Sell	Future			$4.08	-$0.26
								$3.90

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$3.56	Buy	Call	22.21%	$3.60	$0.22	$3.82
CORN	04/30	$3.56	Buy	Call	22.21%	$4.40	$0.03	$3.85
CORN	04/30	$3.56	Sell	Put	22.21%	$2.80	-$0.02	$3.83
CORN	05/15	$4.48	Sell	Call	26.48%	$4.40	-$0.38	$3.45
CORN	05/15	$4.48	Sell	Call	26.48%	$5.40	-$0.08	$3.37
CORN	05/15	$4.48	Buy	Put	26.48%	$2.80	$0.00	$3.37
CORN	07/24	$3.86	Buy	Call	32.29%	$5.40	$0.01	$3.38
DELTA:								
CORN	06/16	$5.42	Buy	Future			$5.42	
CORN	06/17	$5.39	Sell	Future			$5.39	$0.03
								$3.41

SAMPLE 9

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$1.86	Buy	Put	22.21%	$1.80	-$0.09	$1.71
CORN	04/30	$1.86	Buy	Put	22.21%	$1.40	$0.00	$1.71
CORN	04/30	$1.86	Sell	Call	22.21%	$2.20	$0.03	$1.74
CORN	05/06	$1.46	Sell	Put	26.48%	$1.40	$0.08	$1.82
CORN	05/06	$1.46	Sell	Put	26.48%	$1.20	$0.02	$1.84
CORN	05/06	$1.46	Buy	Call	26.48%	$2.20	$0.00	$1.84
CORN	06/18	$2.34	Sell	Put	29.24%	$1.80	$0.02	$1.86
CORN	06/18	$2.34	Buy	Put	29.24%	$2.40	-$0.21	$2.25
CORN	06/18	$2.34	Buy	Put	29.24%	$1.20	$0.00	$2.25
CORN	06/24	$2.75	Sell	Put	29.24%	$2.40	$0.07	$2.32
CORN	06/24	$2.75	Buy	Put	29.24%	$2.80	-$0.23	$2.49
CORN	07/06	$3.13	Sell	Put	32.29%	$2.80	$0.10	$2.59
CORN	07/06	$3.13	Buy	Put	32.29%	$3.20	-$0.29	$2.70
Expire	11/20	$3.40						**$2.90**

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$1.86	Buy	Call	22.21%	$1.80	$0.15	$1.95
CORN	04/30	$1.86	Buy	Call	22.21%	$2.20	$0.03	$1.98
		$1.40 put option not sold due to insufficient premium						
CORN	04/30	$1.86	Buy	Put	22.21%	$1.40	$0.00	$1.98
CORN	05/06	$1.46	Sell	Call	26.48%	$1.80	-$0.02	$1.96
CORN	05/06	$1.46	Buy	Call	26.48%	$1.40	$0.14	$1.70
CORN	05/06	$1.46	Sell	Put	26.48%	$1.40	-$0.08	$1.62
CORN	06/18	$2.34	Sell	Call	29.24%	$2.20	-$0.25	$1.37
CORN	06/18	$2.34	Sell	Call	29.24%	$2.80	-$0.05	$1.32
DELTA:								
CORN	07/01	$2.89	Buy	Future			$2.89	
CORN	07/28	$2.77	Sell	Future			$2.77	$0.12
CORN	07/30	$2.84	Buy	Future			$2.84	
CORN	07/31	$2.64	Sell	Future			$2.64	$0.20
CORN	08/06	$2.95	Buy	Future			$2.95	
CORN	08/11	$2.73	Sell	Future			$2.73	$0.22
CORN	08/19	$2.82	Buy	Future			$2.82	
CORN	08/20	$2.79	Sell	Future			$2.79	$0.03
CORN	08/24	$2.93	Buy	Future			$2.93	
CORN	08/27	$2.72	Sell	Future			$2.72	$0.21
CORN	09/15	$2.88	Buy	Future			$2.88	
CORN	09/17	$2.79	Sell	Future			$2.79	$0.09
CORN	09/22	$2.84	Buy	Future			$2.84	
CORN	09/23	$2.71	Sell	Future			$2.71	$0.13
CORN	10/01	$2.82	Buy	Future			$2.82	
CORN	10/02	$2.69	Sell	Future			$2.69	$0.13
CORN	01/07	$2.86	Buy	Future			$2.86	
CORN	10/13	$2.76	Sell	Future			$2.76	$0.10
CORN	10/14	$2.83	Buy	Future			$2.83	$0.03
								$2.58

SAMPLE 10

Short position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	04/30	$2.19	Buy	Put	22.21%	$2.20	-$0.15	$2.05
CORN	04/30	$2.19	Buy	Put	22.21%	$1.80	-$0.02	$2.03
CORN	04/30	$2.19	Sell	Call	22.21%	$2.60	$0.03	$2.06
		$2.20 put option not sold due to insufficient premium						
CORN	06/02	$3.06	Buy	Put	29.24%	$3.00	-$0.21	$2.65
CORN	06/12	$3.41	Sell	Put	29.24%	$3.00	$0.09	$2.74
CORN	06/12	$3.41	Buy	Put	29.24%	$3.40	-$0.26	$2.88
CORN	08/10	$2.56	Buy	Call	26.83%	$2.60	-$0.13	$2.75
		$1.80 put option not sold due to insufficient premium						
		$2.00 put option not sold due to insufficient premium						
CORN	08/10	$2.56	Sell	Put	26.83%	$2.20	$0.02	$2.77
DELTA:								
CORN	05/29	$2.68	Buy	Future			$2.68	
CORN	08/10	$2.56	Sell	Future			$2.56	-$0.12
								$2.65

Long position								
Contract	Date	Futures price	Buy/Sell	Option	Vols	Strike	Premium	Net price
CORN	02/13	$2.04	Buy	Call	19.32%	$2.00	$0.16	$2.16
CORN	02/13	$2.04	Buy	Call	19.32%	$2.40	$0.03	$2.19
		$1.60 put option not sold due to insufficient premium						
CORN	02/13	$2.04	Buy	Put	19.32%	$1.60	$0.01	$2.20
		$2.00 call option not sold due to insufficient premium						
CORN	04/06	$1.21	Buy	Call	22.21%	$1.20	$0.09	$1.89
CORN	04/06	$1.21	Sell	Put	22.21%	$1.60	-$0.40	$1.49
CORN	06/02	$3.06	Sell	Call	29.24%	$2.40	-$0.69	$0.80
CORN	06/02	$3.06	Sell	Call	29.24%	$3.60	-$0.08	$0.72
CORN	08/10	$2.56	Buy	Call	29.05%	$3.60	$0.01	$0.73
DELTA:								
CORN	06/18	$3.64	Buy	Future			$3.64	
CORN	06/25	$3.53	Sell	Future			$3.53	$0.11
CORN	06/29	$3.61	Buy	Future			$3.61	
CORN	06/30	$3.54	Sell	Future			$3.54	$0.07
CORN	07/01	$3.61	Buy	Future			$3.61	
CORN	07/02	$3.53	Sell	Future			$3.53	$0.08
CORN	07/06	$3.73	Buy	Future			$3.73	
CORN	07/07	$3.57	Sell	Future			$3.57	$0.16
								$1.15