

**BANKING SECTOR, STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH
IN ZIMBABWE: A MULTIVARIATE CAUSALITY FRAMEWORK**

By

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TABLE OF CONTENTS

Chapter	Page
The thesis statement	iv
Declaration	iv
Summary	v
Key terms	v
Dedication	vi
Acknowledgement	vi
Acronyms	vii
1. Introduction to the study	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Objectives of the study	4
1.4 Scope of the study	5
1.5 Justification of the study	5
1.6 Organisation of the study	6
1.7 Research ethics	6
1.8 Validity in research	7
1.9 Chapter conclusion	7
2. Literature review	8
2.1 Introduction	8
2.2 Banking sector and stock market development	8
2.2.1 Financial intermediation theory	9
2.2.2 Neo-classical theory	15
2.3 Banking sector, stock market development and growth	21
2.3.1 The stage-of-development theory	22
2.4 Chapter conclusion	32
3. Research Methodology	33
3.1 Introduction	33
3.2 Hypothesis development	33
3.3 Data and Methodological issues	35

3.3.1 Data sources	35
3.3.2 Measurement of variables	37
3.3.3 Methodological issues	42
3.4 Research design and estimation techniques	44
3.4.1 Main Estimation technique - The VECM	44
3.4.2 Robustness tests –The ARDL model	50
3.5 Chapter conclusion	54
4. Preliminary Data Analysis	56
4.1 Introduction	56
4.2 Trend Analysis	56
4.2.1 Banking sector trends in Zimbabwe	56
4.2.2 Stock market trends in Zimbabwe	60
4.2.3 Economic growth trends in Zimbabwe	62
4.3 Descriptive statistical analysis	65
4.4 Correlation analysis	68
4.5 Chapter conclusion	69
5. Data analysis and discussion of results	70
5.1 Introduction	70
5.2 Unit root tests	70
5.3 Co-integration tests	73
5.4 Causality analysis	75
5.4.1 Long run VECM causality	75
5.4.2 Short run VECM causality	78
5.4.3 Diagnostic tests	80
5.5 Robustness test	81
5.5.1 F-bounds Co-integration test	81
5.5.2 Long run robustness test-ARDL estimates	82
5.5.3 Short run Wald test	85
5.5.4 Model diagnostics	88
5.6 Chapter conclusion	89
6. Conclusion and policy implications	90
6.1 Introduction	90

6.2 Summary of empirical results	90
6.3 Contribution of the study	94
6.4 Conclusion	95
6.5 Recommendations based on the findings	98
6.6 Limitations of the study	101
6.7 Suggestions for further research	101
List of references	103

THE THESIS STATEMENT

DECLARATION

Name: Weston Dzikiti

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I declare that “**BANKING SECTOR, STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH IN ZIMBABWE: A MULTIVARIATE CAUSALITY FRAMEWORK**” 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

24 February 2017
DATE

SUMMARY

The thesis examined the comprehensive causal relationship between the banking sector, stock market development and economic growth in a multi-variate framework using Zimbabwean time series data from 1988 to 2015. Three banking sector development proxies (total financial sector credit, banking credit to private sector and broad money M3) and three stock market development proxies (stock market capitalization, value traded and turnover ratio) were employed to estimate both long and short run relationships between banking sector, stock market and economic growth in Zimbabwe. The study employs the vector error correction model (VECM) as the main estimation technique and the autoregressive distributed lag (ARDL) approach as a robustness testing technique.

Results showed that in Zimbabwe a significant causal relationship from banking sector and stock market development to economic growth exists in the long run without any feedback effects. In the short run, however, a negative yet statistically significant causal relationship runs from economic growth to banking sector and stock market development in Zimbabwe. The study further concludes that there is a unidirectional causal relationship running from stock market development to banking sector development in Zimbabwe in both short and long run periods. Nonetheless this relationship between banking sector and stock markets has been found to be more significant in the short run than in the long run. The thesis adopts the complementary view and recommends for the spontaneity implementation of monetary policies as the economy grows. Monetary authorities should thus formulate policies to promote both banks and stock markets with corresponding growth in Zimbabwe's economy.

Key terms

Banking Sector Development, Stock Market Development, Economic Growth, Gross Domestic Product, Financial Sector Credit, Banking Credit to Private Sector, Broad Money Supply (M3), Turnover Ratio, Stock Market Capitalisation, Value Traded, Vector Error Correction Model, Autoregressive Distributed Lag, Zimbabwe.

DEDICATION

I dedicate this dissertation to my parents, Mr and Mrs Dzikiti who provided me with the foundations of education. Without them, I could not be where I am now. I also dedicate this study to my wife Patience Yoroni Dzikiti, for providing me with the necessary moral and financial support during this long journey. Lastly I also dedicate this project to my children, Natasha and Natalie Dzikiti for motivating me to carry on with my studies under very challenging circumstances.

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LIST OF ABBREVIATIONS AND ACRONYMS

IFC – International Finance Corporation
RBZ- Reserve Bank of Zimbabwe
IMF- International Monetary Fund
GDP- Gross Domestic Product
ADF- Augmented Dickey Fuller Unit Root Test
ARDL - Autoregressive Distributed Lag
DF-GLS -Dickey Fuller Generalised Least Squares
GDP - Gross Domestic Product
M3- Broad Money
MCAP- Stock Market Capitalisation
ZSE- Zimbabwe Stock Exchange
PP - Phillips and Perron Unit Root Test
FSC - Total Financial Sector credit
TR - Stock Market Turnover
FIs- Financial Intermediaries
IMF- International Monetary Fund
BSD- Banking Sector Development
SMD- Stock Market Development
UECM -Unrestricted Error Correction Model
VECM- Vector Error Correction Model
VT-Stock Value Traded
ZIMSTATS- Zimbabwe Central Statistics
WDI- World Bank Development Indicators

CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 BACKGROUND

Multiple studies have analysed and explored the interdependence, let alone combined impact on economic growth of stock market and banking sector developments. Such studies however, have been based mostly on developed economies (Owusu, 2012:18). One such study by Gries et al. (2009) argues that emerging stock markets augment banking activities by providing equity capital. This results in higher debt to equity ratios – thus more business for the banks which in turn boosts economic growth. Solo (2013) expresses the same theory but goes further stressing the critical significance of the banking system and stock market in fostering economic growth. Boot and Thakor (1997) suggest circumstances when both banks' competitiveness and the efficiency of the stock market can actively promote innovation and future growth by allocating resources to productive units of the economy.

Evidence from cross-country heterogeneity in Sub-Saharan Africa reveals that the interrelationship between the banking sector, stock market development and economic growth has not received sufficient attention in finance literature (Tsauroi and Odhiambo, 2012). Zimbabwe, which demonstrates a paradigm distinct from other Sub-Saharan African countries, has been excluded from many finance and growth studies (Ndlovu, 2013). According to the Reserve bank of Zimbabwe (RBZ) (2016) recent evidence in Zimbabwe suggests that beyond a certain threshold, banking sector and stock market development might actually have a negative effect on economic growth. The Zimbabwe Stock Exchange (ZSE) (2015) has indicated much the same in its statement that in undertaking their roles of being influential over the most productive economic areas, banks face financial constraints in Zimbabwe. In the 2003-2008 financial crisis downsizing of banking sector operations compromised the effect of banking sector development and stock market liquidity on economic growth. In fact, this crippled the ability of the RBZ to perform its function as a lender of last resort.

The RBZ (2015) documents that, the ZSE had by 2003 turned into an explosive source of wealth creation. This wealth was derived merely from trading of financial securities without the injection of significant cash flows into the underlying listed banking institutions. The ZSE was being used as a blue print for the pursuit of speculative activities in contrast to its fundamental function of allocating financial resources to productive sectors of the economy. The stock market has been

characterized by a huge increase in transactions under the auspices of negative real interest rates (ZSE, 2010). Such negative interest rates discourage investment and growth, but assist undesirable levels of speculation and in turn bring about depreciation in net worth of these banks.

The debate on the relationship between financial development and economic growth has recently received attention in both developed and developing countries (Tsaurai, 2015). The thrust of this debate has been whether financial sector development brings about economic growth (supply-leading hypothesis), or whether it is economic growth that causes financial sector development (demand-following hypothesis). A large body of studies have emerged, both at the theoretical and the empirical level, that have attempted to answer these questions but no consensus has as yet been reached. These studies include evidence from Bencivega et al. (1996) which revealed that there is a unidirectional causality running from economic growth to banking sector development, given efficient functioning stock markets. Kadenge and Tafirei (2014) agree stressing that if economic growth is to be accelerated, banking sector should be complemented by well-functioning stock markets in order to reduce the inefficiencies associated with developing countries' weak credit markets. Moreover, Owusu (2012) postulates that stock market liquidity facilitates profitable interaction between the stock market and banking sector in that shares become readily acceptable as collateral in bank lending, thereby boosting credit, investment and economic growth.

Ndlovu (2013) has shown that banks perform a better role in promoting economic growth than stock markets especially when it comes to resource allocation. Singh (2008) indicates that stock markets do not lead to long-run economic growth because of macroeconomic instability, volatility and the arbitrariness of the pricing process. However, Boyd and Prescott (1986), Boyd and Smith (1998) and Blackburn et al. (2005) have all shown that both stock markets and banks are necessary in promoting economic growth; they therefore consider stock markets to be complementary to banks.

In contrast, Ogwimike and Salisu (2014) observe that banking sector development exerts a depressing effect on the overall economic growth rate. Craigwell et al. (2012) add that banking sector development is negatively associated with per capita growth only in low income groups. On the other hand, research by Schempter (1912) not only supports existence of a link between stock markets and growth but also factors in the negative effects of interest rates. Studies by Robinson

(1952), N’Zue (2006), Ezeocha et al. (2009) and Tsaurai and Odhiambo (2012) have argued that there is a bilateral causality link that runs from economic growth to stock market development taking into consideration the effects of savings and interest rates.

Against this background of conflicting theoretical and empirical views, the direction of causality (not to mention the robustness of the relationship) between banking sector, stock market development and economic growth warrants a deeper insight. Scenarios postulated by Jecheche (2010) suggest that Zimbabwean financial sector dynamics have brought considerable arguments about banking sector and stock market relationships to the fore-front of academic debate. For this reason, greater insight into the interrelationship among the variables particularly in the context of the Zimbabwean economy is necessary. Unlike previous studies, this research therefore seeks to investigate the interrelationship between the banking sector, stock market development and economic growth drawing on a monetary policy perspective.

1.2 PROBLEM STATEMENT

It has been argued in studies in developed and developing countries (Odhiambo, 2011), that the interplay of banking sector and stock market development promotes economic growth. The situation that prevailed in Zimbabwe during 2003-2008 however, has completely defied most theoretical and empirical postulations including those of Odhiambo (2011), Ogwimike and Salisu (2014) and Ezeocha et al. (2009). Ogwimike and Salisu (2014) argued that a country with a well-developed banking sector promotes economic growth through technological changes and product innovation which in turn creates a high demand for banking services. These views are similar to those of Ezeocha et al. (2009) who found that in Nigeria both stock market development and banks were able to promote economic growth in both domestic and private investment.

Zimbabwean financial sector dynamics have displayed a paradigm different from most European and Sub-Saharan African countries (Ziwengwa et al. 2011). According to the RBZ (2009) banks faced financial constraints against a hype of skyrocketing industrial and mining indices. The International Monetary Fund (IMF) (2010) has documented that in the period 2003-2008 Zimbabwean stock market indices soared to unprecedented heights (595% monthly and 12000% yearly) against a backdrop of falling gross domestic product (GDP) and a collapsing banking sector. This poses the question of what has really accounted for the stagnation in economic growth

that has lasted for years in Zimbabwe, which therefore requires an investigation of the major constraints precluding the ZSE and banking sector from effectively allocating scarce resources.

Empirical studies have also been carried out to explore the impact engendered by the banking sector and stock market on economic growth in Zimbabwe, nonetheless most of these studies have failed to account for the continued plummeting of the economy, not to mention the extreme divergence in stock market and banking sector development indicators (Mutenheri and Green, 2002; Bindu et al. 2009; Makina, 2009; IMF, 2010; Tsauroi and Odhiambo 2012). Hence there exists a need for research to reveal the key underlying factors behind a low growth rate associated with banking sector turmoil and escalating stock market indices in the Zimbabwean economy.

On the other hand, most empirical studies have examined the casual relationship between stock markets and economic growth, but none of them have incorporated banking sector development and its impact combined with that of the stock market in their analysis (Ishioro, 2013). The present study henceforth attempts to provide an elucidation of an unsettled matter on the interrelationship between banking sector and stock market development for economic growth stimulation purposes. Given the important role of stock markets and banks in both developed and developing economies, recent research has simultaneously modelled stock market, banks and economic growth in empirical studies (Abu-Bader and Abu Qarn, 2008; Ogwumike and Sasilu, 2014; Ndlovu, 2013; Tafirei and Kadenge, 2014; Pradhan et al. 2014). They have all shown that both the stock market and banks are necessary in promoting economic growth and have considered stock markets as complementary to banks rather than substitutes.

1.3 OBJECTIVES OF THE STUDY

The study aimed to accomplish the following objectives.

- i) To examine a long run relationship between banking sector and stock market development in Zimbabwe.
- ii) To investigate the direction of causality between banking sector, stock market and economic growth in Zimbabwe
- iii) To investigate the co-integrating relationship between banking sector, stock market and economic growth in Zimbabwe.

1.4 SCOPE OF THE STUDY

The study focuses precisely on the operations of the entire banking sector, the stock market and their developmental linkage with economic growth in Zimbabwe. In line with the research objectives, empirical investigations were carried out on the impact of banking sector and stock market development on the economic growth prospects of the Zimbabwean economy. This study did not cover all the variables that proxy financial sector development and the economy as a whole; nonetheless it does focus on the interdependence between banking sector and stock market development as they impact on the Zimbabwean economy. The usefulness of the research findings is limited to Zimbabwean economic dynamics, thus they cannot be generalised. Only in a developing economy with financial market dynamics similar to those in Zimbabwe could these results apply. The study further identifies and examines the interrelationship between banking sector and stock market by alluding to a Zimbabwean type of market associated development for the period 1988 to 2015.

1.5 JUSTIFICATION OF THE STUDY

Many earlier studies on the effects of banking sector and stock market development on economic growth are based predominantly on evidence from Latin American and East Asian countries (Owusu, 2012). Little attention has been devoted to African countries, especially those in the Southern African region. Therefore a need exists for studies that explore the finance-growth relationship in the Southern African region. This research aims to make a meaningful contribution to the understanding of the extent to which banking sector and stock market development in Zimbabwe have influenced economic growth. Evidence from empirical literature in Africa reveals that the causal relationship between banking sector development, the stock market and economic growth has not received much attention (Ziwengwa et al (2011)). Zimbabwe, which has presented a different picture in the finance-growth arena, has been excluded from many studies of the sub-Saharan African region. This therefore calls for further research to provide a reflection on the major constraints preventing the financial sector from keeping pace with economic growth.

The current research contributes to the literature on finance and growth relationships by establishing the interdependence between the banking sector, stock market development and economic growth in Zimbabwe. In addition, the study aimed to reveal the direction of causality

and the magnitude of the relationship between banking sector, stock market development and growth in its attempt to supplement theoretical and empirical views in this research area. The study further offered the researcher an opportunity to develop research skills which would be a good foundation for research at a more advanced level.

1.6 ORGANISATION OF THE STUDY

Of the six chapters that comprise this study, the first introduces the study by discussing the background, scope and the research objectives. The second Chapter reviews related theoretical and empirical literature while Chapter three focuses on the research methodology, empirical model specification and estimation techniques. Preliminary data analysis is conducted in Chapter four of the study. Chapter five presents an analysis of the actual results from the empirical estimation techniques. Research findings are also discussed and synthesised with theory and other empirical studies in this chapter. Lastly, Chapter six summarises, concludes and finally suggests areas to be focused on in further studies on banking sector, stock market development and economic growth in Zimbabwe.

1.7 RESEARCH ETHICS

In order to comply with Unisa's code of conduct in ethical research, the researcher adhered strictly to Creswell's (2008:145) assertion that those researchers who use the quantitative approach in research should observe the importance of ethical considerations. The Unisa research committee granted ethical clearance on the grounds that the study committed itself to respecting the rights, needs, desires, credibility and values of the data providers (participants) in the research process. This clearance was also based on the condition that the data gathering process was susceptible to minimal risk and that assurance was given to participants on protection of corporate image, human dignity, confidentiality and unlimited access to information. Quantitative ethical research guidelines served as the standards and basis upon which the researcher evaluated his own conduct while endeavoring to observe the best practices in ethical research. Since this research involved gathering of publicly available time series data from widely available impersonal sources, it was not subjected to the ethical research principles cited by Best and Kahn (2006:300), namely informed consent, safety of participants, privacy and anonymity. Equitable selection of data providers remained an exercise in which non-discrimination was observed among institutions in the population, with respect to size, organizational culture, values and work ethics.

1.8 VALIDITY IN RESEARCH

The researcher adhered to the principles of trustworthiness throughout the research process. Trustworthiness is a method of ensuring rigor in quantitative research without sacrificing relevance. The findings of the study are the real issues to which the Zimbabwean economy, banking sector and stock market development were susceptible, without leaving out or distorting any information. According to Best and Kahn (2006:307), credibility in qualitative and quantitative research is the ability of the researcher to demonstrate a prolonged period of engagement with participants (data providers), among other things. As mentioned above, reviewing existing literature through documentary analysis is known to be an effective data-gathering tool and as such great care was taken with respect to the design and formulation of the procedure of collating data. Data reviewing procedures were peer-reviewed and discussed with other research experts in order to promote the validity of this study and its findings in research.

1.9 CONCLUSION

This chapter provided an introduction to the study of the interrelationships between banking sector and stock market development *vis-a-vis* background, problem statement, research objectives and scope. Theory provides conflicting predictions regarding the finance -growth nexus thus a clear need exists for empirical research to further throw more light on the direction of causality, as well as on the robustness of the finance-growth link. The following chapter, Chapter 2, provides more information on related theoretical and empirical reviews of the nexus between banking sector, stock market development and economic growth.

CHAPTER 2: LITERATURE REVIEW

2.1: INTRODUCTION

Over the years, traditional theories of banking sector development have been based on transaction costs and asymmetric information (Gurley and Shaw, 1960). These theories were designed to account for institutions that take deposits and channel funds to investors; however, in recent decades there have been significant changes, some of which include an increase in intermediation services, transformation and broadening of banks' product ranges and related offerings in both money and capital markets. Although transaction costs and asymmetric information have declined in these financial markets, intermediation has increased considerably. For instance, in Zimbabwe new markets for financial futures and options are intended mainly for banks as intermediaries rather than individuals or firms. Banks no longer focus solely on deposit taking as their main role: they are now engaging in various forms of financial intermediation.

This chapter therefore discusses previous researches on financial intermediation (development) with special reference to theoretical and empirical views as postulated by related finance-growth literature. Related literature is reviewed in relation to the nexus between banking sector and stock market development and banking sector, stock market development and economic growth. A discussion of the theoretical and empirical assumptions underlying the theory supported by a review of related finance-growth literature is also provided. In doing so, converging and diverging theoretical postulations are reviewed first, followed by related empirical views in order to scrutinise the key underpinning stipulations of the theories underlying development in the banking sector and stock market. The remainder of the chapter comprises two broad sections that make up the literature review. Section 2.2 contains a discussion of theoretical and empirical literature on the relationship between the banking sector and stock markets. This is followed by section 2.3 which focuses on theoretical and empirical stipulations of the combined relationship between banking sector development, stock market development and economic growth. Respective econometric models substantiating financial development and growth theories are presented in each case as supported by empirical literature.

2.2 BANKING SECTOR AND STOCK MARKET DEVELOPMENT

Historical and current theories of financial development are reviewed in this section as postulated by related finance-growth literature. This section gives precedence to the discussion of theoretical

and empirical presuppositions supported by extant finance-growth literature. There are two theories that account for the relationship between banking sector and stock market development. These are the financial intermediation theory and the neo classical theory.

2.2.1 Financial intermediation theory

The financial intermediation theory conceptualised by Garley and Shaw (1960) explains the functions of financial intermediaries, the manner in which financial intermediation processes influences the economy as a whole and the effects of government policies on financial intermediaries. This theory stresses the roles and functions performed by financial intermediaries in the economy (Andries, 2009). Most studies conducted in this field have highlighted the role of financial intermediaries in achieving sustainable economic growth and accentuating the role of the central bank in the regulation, supervision and control of financial intermediaries (Leland and Pyle, 1977).

Diamond and Dybvig (1983) argued that a financial intermediary is a financial institution which enhance the transfer of funds from surplus units to deficit units in the economy. Nzotta and Okereke (2009) concurred and went further to stipulate that financial intermediaries can be distinguished by four features, namely: their deposits are specified for a fixed sum, deposits are typically short-term than their assets, a high proportion of their liabilities can be withdrawn on demand, and their liabilities and assets are largely not negotiable.

There are exceptions to this, however, especially when we consider certificates of deposit and securitization as these are highly negotiable securities (Scholtens and Wensveen, 2003). The financial intermediation theory is based on the three approaches to financial development: the information asymmetry approach, the transaction cost approach, and the regulation of monetary creation approach (Garley and Shaw, 1960).

The first approach, the information asymmetry approach, holds that the existence of financial intermediaries is explained by a lack of complete information in useful time (Boot, 2000; Diamond, 1984). Diamond (1984) observes that studies on informational asymmetry approach show that in the relationship between banks and borrowers, the main aspects analysed are the functions of the selected bank, the tracking of the granted loans, the problem of adverse selection

and moral hazard. These information asymmetries can be of an ex ante nature- generating adverse selection, of an interim nature- generating moral hazard or they may be of an ex post nature- resulting in auditing or costly state verification and enforcement. Information asymmetries have been known to breed market imperfections (Boot, 2000). Many of these imperfections lead to specific forms of transaction costs. Financial intermediaries appear to overcome these costs, at least partially, through their abilities to achieve economies of scale (Leland and Pyle, 1977).

The second approach is the transaction cost approach. This approach is based on the differences between the transaction technologies used by the financial intermediaries (Campbell and Kracaw, 1980; Garley and Shaw (1960). Unlike the first approach, this does not contradict the theory of efficient and perfect markets that supports the absence of transaction costs and asymmetries of information in market operations. This approach is based on non-convexities in transaction technologies (Campbell and Kracaw, 1980). According to Garley and Shaw (1960) transaction costs cause imperfections in markets promoting inefficiencies in allocation of resources in the economy.

Freixas and Rochet (2008) support the above explanation and add that the notion of transaction cost constitute not simply the transfer costs of the amounts of foreign exchange, but includes those costs for research, evaluation and monitoring. Thus the role of financial intermediaries (FIs) is to transform the characteristics (due date and liquidity) of assets, the so called qualitative transformation of financial assets, offering liquidity and opportunities for diversification of placements (Fama, 1980; Pyle, 1971; Hellwig, 1991). FIs provide liquidity (Pyle, 1971) and diversification opportunities with a view to eradicate transaction costs (Hellwig, 1991).

The third approach of the financial intermediation theory is the regulation of money creation approach. It is based on the method of regulation of monetary creation, savings and the financing of the economy (Guttentag and Lindsay, 1968; Merton, 1995). The method of regulation of money creation processes influences liquidity and solvability of FIs (Merton, 1995). Diamond and Rajan (2000) have shown that the regulation of intermediaries has an impact on their health, capital adequacy, refinancing and the method of recovering debts. Akinlo and Egbitunde (2010) add that bank capital affects bank safety, the bank's ability to refinance, and the it's ability to extract repayment from borrowers or its willingness to liquidate them. The legal-based view sees

regulation as a crucial factor that shapes the financial economy and as a result many regard financial regulation as something that is absolutely exogenous to the financial industry (Andries, 2009).

There exist a considerable number of empirical studies for and against the financial intermediation theory. Many authors have firmly confirmed the assumptions of the traditional intermediation theory while others have critiqued it advocating for a more modernised theory that incorporates recent development in information technology, regulations and operations of financial markets (Dey, 2003). One author who has maintained his line of arguments in favour of the financial intermediation theory is Diamond (1984) who believed that literature's emphasis on the role of intermediaries is particularly strong on reducing the frictions of transaction costs and asymmetric information.

Several others have concurred and expanded on these two contributions, advancing in substantive ways the notion that while these factors may once have been central to the role of banks, they are increasingly relevant (Shaw, 1973; Scholtens and Wensteen, 2003; Egert et al, 2007; Howells and Bain, 2007; Owusu, 2012). Egert et al (2007) found positive results in support of the financial intermediation theory concluding that financial intermediaries have been fulfilling certain main functions of late such as the brokerage and asset transformation functions. Brokerage function involves the matching of transactions and the provision of transactions and other services (Howells and Bains, 2007). In performing such functions financial intermediaries reduce transaction costs and avoid asymmetrical information woes. Owusu (2012) agrees with the financial intermediation views believing that the most important contribution of contemporary intermediaries is the steady flow of funds from surplus to deficit units.

A study by Scholtens and Wensteen (2003) confirmed the assumptions of the financial intermediation theory also by finding out that intermediaries overcome asymmetric information problems by acting as delegated monitors. Gwilym (2012) observes that it is frictions such as transaction costs and asymmetric information that are important in understanding intermediation. Shaw (1973) and Beck (2011) shared similar yet related lines of thinking when they stress the role of transaction costs. They argue that fixed costs of asset evaluation mean that intermediaries have an advantage over individuals because they allow such costs to be shared. Similarly, trading costs

mean that intermediaries can more easily be diversified than individuals (Howell and Bains, 2007). In addition, Capasso (2008 :p258-260) notes that while looking for frictions that relate more to investors' information sets, several authors have stressed the role of asymmetric information as an alternative rationalisation of the significance of the theory of financial intermediation.

Ang (2008) examined the validity of the financial intermediation theory and noted that, the critical role of intermediation is the transformation of large-denomination financial assets into smaller units. Thus banks (financial intermediaries) have the capacity to exploit the sub-optimal portfolio choice of depositors and to offer the risk-return combination of financial assets that households demand. Bhattacharya and Thakor (1993) supports the financial intermediation theory in their argument regarding the sophistication of banks in providing products that suit customer demands, by offering divisibility services. Moreover, Cule (2009) augmented the financial intermediation theoretical postulations and further stressed that since banks (Financial intermediaries) can break down assets into smaller units, they are able to reduce transaction costs and to employ diversification for the benefit of both their customers and the equity holders.

Contemporary financial intermediation theory posits that banks (financial intermediaries) have an additional role as evaluators of depositor's credit risk (Gwilym, 2012; Egert et al. 2007). They function as a filter to evaluate signals in a financial environment with limited information. Karbo and Adamu (2009) argues that as a result of these asymmetries of information, individuals find it difficult to evaluate other agents' credit risks. This gives rise to financial intermediaries playing an important role in the evaluation and purchase of financial assets.

In a study examining the usefulness of financial intermediation theory, Badum (2009) found that there exist numerous further reasons for the dominance of intermediation over the past few decades. These includes: transaction costs, liquidity, capital formation, risk management, insurance, information-sharing coalitions and delegated monitoring. Thus over the past few decades the functions and focus of the financial intermediaries have likewise transformed. Findings from empirical studies in support of the financial intermediation theory constitute what is termed the financial intermediaries (bank) based view (Beck and Levine, 2004). This view emphasises the positive role of financial intermediaries in economic growth and also stresses the shortcomings of market-based financial structures. Studies consistent with this theoretical view

include those by Gerschenkron (1962), Levine (2008), Badum (2007) and, Boyd and Prescott (1986).

Empirical literature provides well founded arguments in support of financial intermediation by banks (Freixas and Rochet, 2008). Such literature is vehemently opposed to operations of markets reiterating the point that the contribution of banks has further reaching positive effects than that of markets and not vice versa. Proponents of this view include; Beck and Levine (2002), Ndako, (2008), Nzotta and Okereke (2009) and, Freixas and Rochet (2008). Ezeocha et al(2009) points out that in liquid markets, investors can cheaply and quickly sell their shares and consequently have fewer incentives to expend resource monitoring managers. Financial intermediary (FIs) based systems mitigate this problem because FIs reveal less information in public markets. In investigations that use least squared regressions Nzotta and Okereke (2009) and Ndako (2008) concluded that capital markets development did not significantly affect GDP per capita owing to inherent imperfections in financial markets.

Coporale et al (2005) have confirmed the intermediation theory and further provide an excellent analysis of the current state of the financial intermediation theory. In this view, contemporary intermediation literature argues that intermediation is now centered on banks as facilitators of risk transfer; these banks are now dealers in the increasingly complex maze of financial instruments and markets (Gale and Hellwig, 1985; Blackburn et al. 2005; Singh, 2008). The role or roles played by these intermediaries in the financial sector surfaces in various models in the area known as modern intermediation theory (Singh, 2008). Blackburn et al. (2005) hypothesized that in a scenario of perfect knowledge, no transaction costs and no indivisibilities, financial intermediaries would be unnecessary, but these conditions do not exist in the real world. Thus traditional financial intermediation theoretical views are built on the models of resource allocation based on efficient, perfect and complete markets, which are impossibility in reality.

A study by Beck (2008) strongly contrasted the traditional view of the role and functions performed by intermediaries over the last few decades. This study attempted to confront the literature with a view to determining whether literature adequately addresses the reasons for these institutions to exist in the financial markets, and how they perform value added activities. Financial systems in many African countries such as Zimbabwe have undergone a dramatic transformation

in recent years (Ndlovu, 2013). Financial markets such as the stock and bond markets have grown in size as a result of the emergence of various mortgage backed securities and other securitized assets (including derivative instruments such as swaps and complex options) (Beck and Levine, 2004). This has resulted in all had a virtual explosion in volume against the back of a collapsing Zimbabwean economy which posed questions about the direction and nature of relationship between finance development and growth in Zimbabwe.

Cule, (2009) shares similar sentiments and further argues against the traditional roles and functions of financial intermediaries by stipulating that, new exchanges for financial futures, options and other derivative securities have emerged as the new focal markets for intermediaries. This increase in the breadth and depth of financial markets is the result of the increased use of these instruments by financial intermediaries and firms: as yet, they have not been used by households to any significant extent in Zimbabwe (Ishioro, 2013; Allen, et al (2012). Thus the increased size of the Zimbabwean financial market has coincided with a dramatic shift away from direct participation by individuals in financial markets, towards participation through various kinds of intermediaries.

Over this same time period the importance of different types of intermediaries has also undergone a significant transformation (Scholtens and Wensteen, 2003). This is evidenced by downsizing of the share of assets held by banks and insurance companies, while mutual funds and pension funds have increased dramatically in size in the Zimbabwean economy for the period 2003-2008. In addition new types of intermediaries such as non-bank financial firms have emerged in Zimbabwe and these raise money only by issuing securities and not by taking deposits (Jecheche 2010). Thus this study attempts to provide answers to the ongoing and controversial issue of whether financial intermediation hinders growth in Zimbabwe or not.

Solo (2013) supports this argument against the financial intermediation theory and notes that the traditional financial intermediation theory has declined in importance even as the financial sector itself has been expanding. This is revealed in the activities of traditional financial institutions such as banks and insurance companies which have changed significantly. In the same line of analysis Levine (2002) reported that non deposit taking FIs (insurance firms) realised that their actuarial function was but a minor part of their asset management capabilities and these firms too innovated and broadened their product and service offerings. Although, some of these changes in the volume

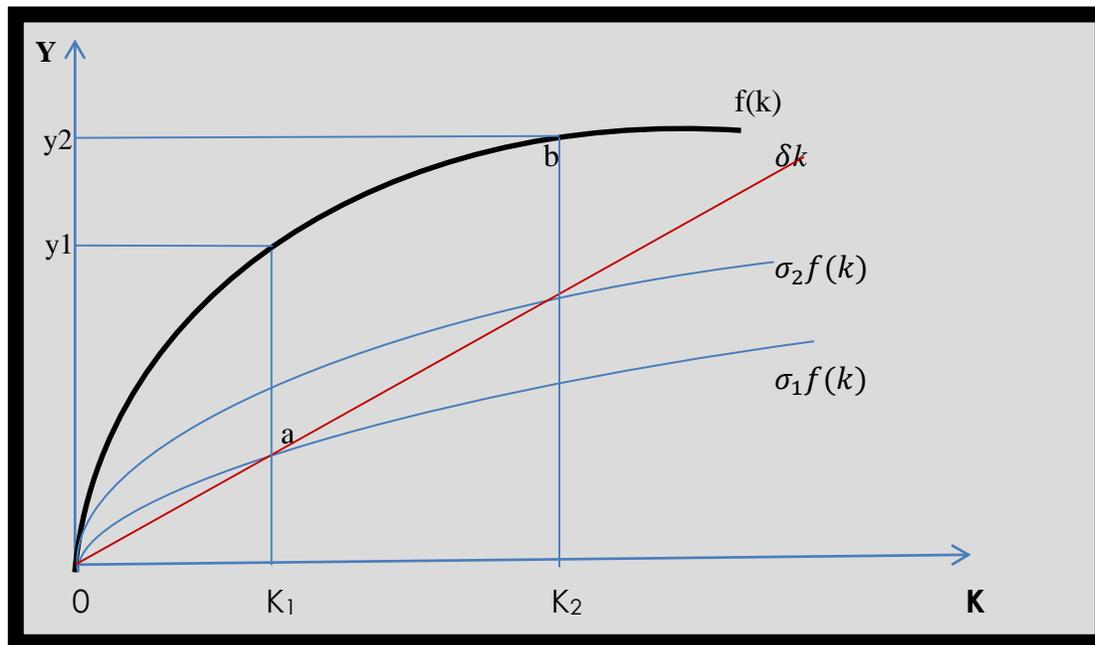
of financial activity, along with the relative importance of some institutions and the changes in others, can be explained using traditional financial intermediation theory, others cannot (Santamero, 1998; Solo, 2013; Ang, 2008). This is clear in the emergence of mutual funds, which have facilitated trading at significantly lower costs, so that diversification can be achieved much more cheaply in the Zimbabwean banking sector.

2.2.2 Neo-Classical theory

The Neo-Classical theory was hypothesised by Solow (1956) and it is another theory that underlies the relationship between banking sector and stock market development. It assumes that the interest rate (banking sector development indicator) plays the main role in balancing an economy's savings and investment levels (Solow, 1956). According to the neo-classical Golden Rule, the optimal growth path is equal to the real interest rate. The golden rule holds that for a long time, the design of the financial sector was thought to be of no major importance for economic decision-making and that in the presence of perfect markets, the financial sector produces nothing but a veil over the true determinants of economic development (Thiel, 2001). According to Trew (2006) the link between financial sector development and economic growth may run through various transmission channels. A very simple neo-Classical growth model engenders three connections between financial variables and economic activity. Banking and stock market development might (1) reduce the loss of resources required to allocate capital; (2) increase the savings ratio; or (3) raise capital productivity. The so-called AK model put forward by neo-classicists assumes only one type of goods, which are produced with capital as the only input factor (Pagano, 1993).

Taking an aggregate production function point of view, each of these three financial linkages may contribute to the transformation of a given amount of savings and investment inputs into a larger amount of output through either a capital accumulation channel (Hicks, 1969) or a technological change channel (Schumpeter, 1912). For instance, if we consider the capital accumulation channel illustrated in the common Solow growth model in Figure 1 which follows, an increase in the savings rate (δ) will increase the steady-state levels of capital (k) and per capita output (y). As shown in Figure 1 the shift from δ_1 to δ_2 causes steady state k to rise from k^*1 to k^*2 and per capita output to rise from y^*1 to y^*2 .

Figure 1: Effects of savings on capital accumulation

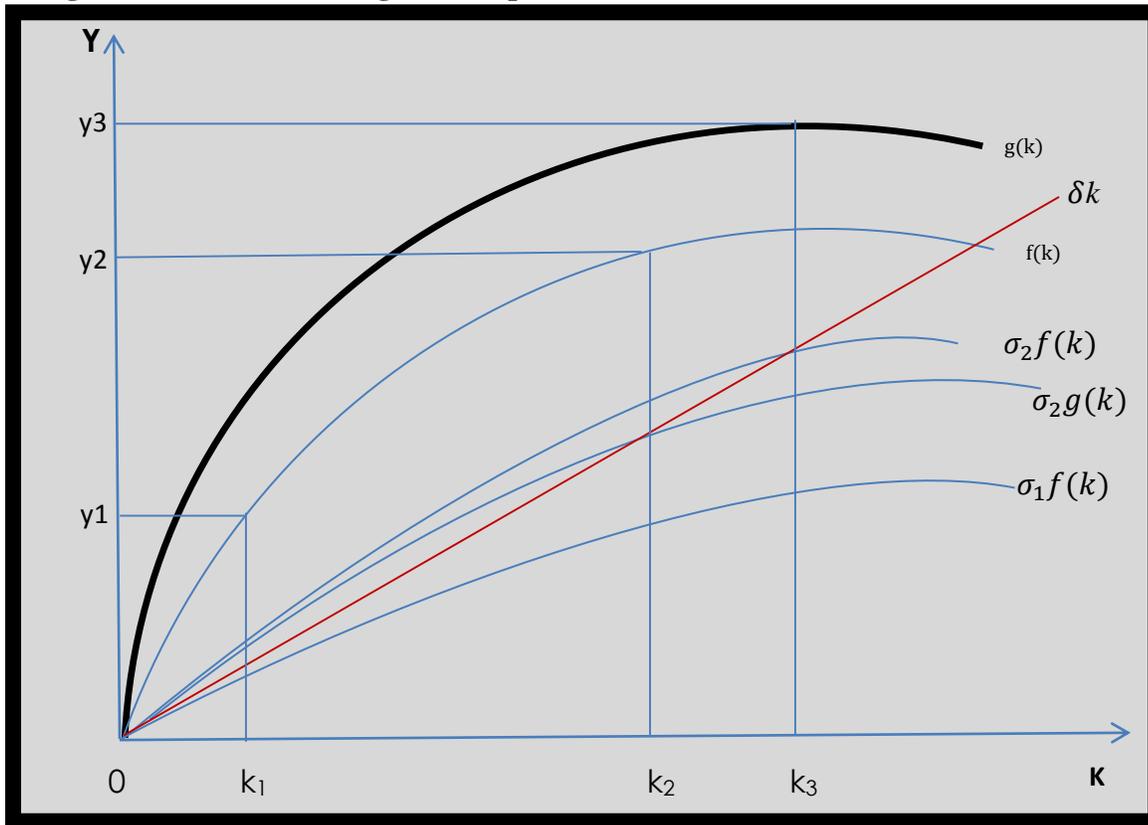


Source: Adapted from Aghion et al. (2005).

The eradication of financial repression policies and a reduction in financial market imperfections and related failures are also likely to improve the quality of investment as only projects with returns greater than the interest rate are funded. This implies that the entire production function will shift up, from $f(K)$ to $g(K)$. This increase in the economy's efficiency further increases savings because $\delta_2 g(K) > \delta_2 f(K)$, as shown in Figure 2. It can be observed in figure 2 that the new steady-state levels of per-worker capital stock and per-worker output, k^*3 and y^*3 respectively, exceed not just the original levels, k^*1 and y^*1 but also the higher levels brought about by the increase in savings and investment, k^*2 and y^*2 only.

Osuji and Chigbu (2012) observes that the major role of the financial sector's contribution to the raising of production is that it monitors how investment projects are managed. The Solow model take into consideration only the short-term and medium-term effects of improvements in financial development, as it does not explain technological advancement or long- run economic growth. This limitation of the Solow growth model leads to the Schumpeterian model of growth.

Figure 2: Effects of savings on Output



Source: Adapted from Aghion et al (2005)

Schumpeter conceptualises that a well-developed financial sector is essential if entrepreneurs are to successfully engage in a process of ingenuity (Wood, 2012). New projects require financing since innovation is costly, and upfront investment cannot always be covered by the entrepreneurs themselves. Without the financial sector channeling funds from savers to the most capable entrepreneurs, innovation would be nearly impossible and there would be little permanent economic growth.

A growing number of empirical studies have also validated their claims in support of the Neo-classical theory. Two such studies that have firmly confirmed this theory are those conducted by Gale and Hellwig (1985) and by Craigwell et al. (2012) who all argued that in a traditional model of resource allocation, firms and households interact through markets while financial intermediaries play no part. Malkiel (2003) notes that when markets are perfect and complete, the allocation of resources is efficient and there is no scope for intermediation to improve welfare. Allen (2008) reiterated that the Neo-Classical theory has traditionally focused on the real sector of the economy while disregarding the role of financial markets. Shaw (1973) documented that in a

world where markets are complete, where information is symmetrical and there are no other frictions, there is no need for financial intermediaries.

According to the contemporary views of neo-classical theory, financial intermediaries only exist to play a supportive role in the process of perfecting markets. Theil (2001) agrees with this and further notes that as long as there are market imperfections, there will be intermediaries: as soon as these markets are perfected intermediaries become redundant. They will have lost their functions because savers and investors utilise the perfect information needed to find each other directly, immediately and without costs. This is the general equilibrium model of resource allocation in which banks cannot exist (Bindu et al. 2009). Well-founded arguments have been put forward in favour of what theorists call the perfect market-based view. This view highlights the advantages of well-functioning perfect markets in spurring on financial development and stresses the problems of bank-based structures. Proponents of this view include Beck and Levine (2002), Greenwood and Jovanovic (1990), Bencivenga, Smith and Star (1996), Craigwell et al. (2012), Bolbol et al. (2005).

Large, liquid and well-functioning perfect markets foster growth and profit incentives, enhance corporate governance and facilitate risk management (Beck and Levine, 2002). The inherent inefficiencies of powerful banks are also highlighted, for they can obstruct innovation by extracting informational rents and protecting firms with close bank-firm ties from competition thereby impeding efficient corporate governance (Bolbol et al. 2005). Market-based financial systems reduce the inherent inefficiencies associated with banks and are thus more successful in enhancing economic development and growth (Rioja and Valver, 2004). A related argument was developed by Craigwell et al. (2012), who demonstrated through a model that as countries go through different stages of development, they become more market-based with further development.

Adherents of the perfect market-based view argue that banks' market power reduces firm's incentives to undertake profitable projects as banks extract a large share of the profits (Acaravci et al. 2007; Malkiel, 2003; Hondroyiannis et al. 2005; Sasilu, 2014). In addition banks (as debt issuers) have an inherent bias toward conservative investments. As a result bank based systems might limit innovation and growth (Malkiel, 2003). Hondroyiannis et al (2005) concluded that

capital markets in part perform the same basic functions of financial intermediation as banks, and stock markets also provide size, risk, and liquidity transformation between savings and investments. They also facilitate efficient investments through information creation and dissemination, and they provide a form of corporate control. In this respect, perfect stock markets that use time series methods to study the impact of financial development on growth generally find evidence of heterogeneity (Acaravci et al. 2007).

Sasilu (2014), Akinlo and Egbetunde (2010) and Van Nieuwerburg et al. (2006) agreed that perfect stock markets stand to mobilise long-term savings to finance investments, provide equity to entrepreneurs, encourage broader ownership of firms and improve the intermediation process through competitive pricing mechanism. In a study on China Calderon and Lui (2003) found that credit extended by the banking sector at the state level had a negative impact on provincial economic growth. Similarly, De Gregario and Guidotti (1995) discovered evidence of a negative relationship between financial development and economic growth in 12 Latin American countries during the period 1950-1985.

Nonetheless there exists voluminous studies that have challenged the outright efficient market-based view in a neo-classical world and have instead advocated for the financial services view (Merton and Bodie, 1995; Levine, 1997; Boyd and Smith, 1998; World Bank, 2013). The financial services view is in fact consistent with both the neo-classical theoretical (efficient market-based) views and the financial intermediation theoretical (bank-based) view: it maintains that it is financial services themselves that are by far more important than the form of their delivery (World Bank, 2013).

The financial services view does not focus on the source of finance (Levine, 1997): rather, its focus is the creation of an environment where financial services are soundly and efficiently provided. The emphasis is on the creation of better functioning banks and markets rather than on the type of financial structure. This theory illustrates that it is neither banks nor markets that matter, but both. This theory envisages banks and markets as different components of the same financial system; they do not compete, and as such ameliorate different functions in the system (Boyd and Smith, 1998; Thangavelly and Jiunn, 2004; Demirguc-Kunt and Levine, 2000).

Other modern neo-classical theorists have shown however, that in addition to the supportive role played by banks in perfecting markets, there exist two most prominent explanations for the existence of intermediaries: the provision of liquidity and the provision of monitoring service (Shaw, 1973). Studies consistent with modern neo-classical theoretical view includes those by Diamond and Dybvig (1983), Hasan et al. (2007), Gwilym (2012), and Zang and Chul-Kim (2007). Gwilym (2012) builds on the modern theoretical view by revealing that in the issuance of demand deposits, banks can improve efficiency in a competitive market as these deposits allow for better risk sharing among households that face idiosyncratic shocks to their consumption needs over time. The importance of banks in this framework arises from an information asymmetry paradigm, as the shock that affects the consumption needs of a household is not publicly observable.

Hasan et al. (2007) have supported the current neo-classical view and found a special feature in banks acting as delegated monitors of borrowers on behalf of the ultimate lenders (depositors) in the presence of costly monitoring. Neo-classical views are also validated by Gwilym, (2012) who emphasized that banks exploit comparative advantage (comparative to individual lenders or specialised firms such as rating agencies, securities analysts, and auditors) in information production as a result of economies of scale. These reduce the cost of informational asymmetries and their extent in the economy. Diversification reduces the cost of delegating monitoring to a financial intermediary (Zang and Chul-Kim, 2007).

Another contemporary view of the neo-classical theory posits that two reasons exist for efficient stock markets and banking activities to be interdependent (Beck, 2011). Firstly, existing literature on the modern neo-classical theory argues that banking and financial intermediation have a positive impact on stock market development and performance (Fink et al. (2005); Van Nieuwerburgh et al. (2006); Demirguc-Kunt and Maksimovic, 2000). Demirguc-Kunt and Maksimovic (2000) augmented the Neo classical theory and further found that an efficient capital market improves banking activities through fostering economic growth. Empirically, Van Nieuwerburgh et al. (2006) finds support for a financial services view in which banking and efficient stock market activities complements each other in achieving economic growth, even though the evidence provided by Beck et al (2000) suggests that the growth in stock markets is the result of an increasing preference among firms for obtaining external financing from efficient equity markets rather than from banks.

Secondly, stock markets and banks are integral components of the financial infrastructure of national economies, which operate under a common institutional framework that includes legal origin and other institutional characteristics. These include liberalisation denoted by growth in the stock market, which affects both stock market turnover and banking development (Levine, 1997; Gveroski, 2009). The effectiveness of banks and intermediaries as monitors depends on a country's disclosure, shareholder protection laws and arguably on banking sector efficiency which is an integral part of the common institutional efficiency (Shahnoushi, et al. 2008; Bonin and Wachtel, 2003). Today, most developed countries rely on both stock and bond markets as well as on banks for channeling savings into investments (Beck et al. 2000). This holds for the Zimbabwean economy as well, wherein banks and markets are complementary in service provisioning through instruments such as securitisation, allowing exit strategies for venture capitalists and by being in competition with each other.

2.3 BANKING SECTOR, STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH.

Academic research on the finance-growth nexus dates back at least to Schumpeter (1912), who emphasised the positive role of financial development (banks and stock market development) on economic growth. The relationship between financial development and economic growth has been a subject of great interest and debate among economists for many years. The debate on the relationship between financial development and economic growth has recently received attention in numerous empirical studies in both developed and developing countries. The thrust of this debate has been whether financial sector development causes economic growth (supply-leading hypothesis), or whether it is the growth of the real sector that causes financial sector development (demand-following hypothesis). A large body of literature has emerged, at both the theoretical and empirical level, which has attempted to answer these above questions however it appears that no consensus has been reached yet.

Although several empirical studies have investigated the relationship between financial depth, defined as the level of development of financial markets and economic growth, the results have been ambiguous (Pagano, 1993; Levine, 2008). Patrick (1966) endeavored to formalise the debate by developing the Stage-of-development theory of financial development. This literature review

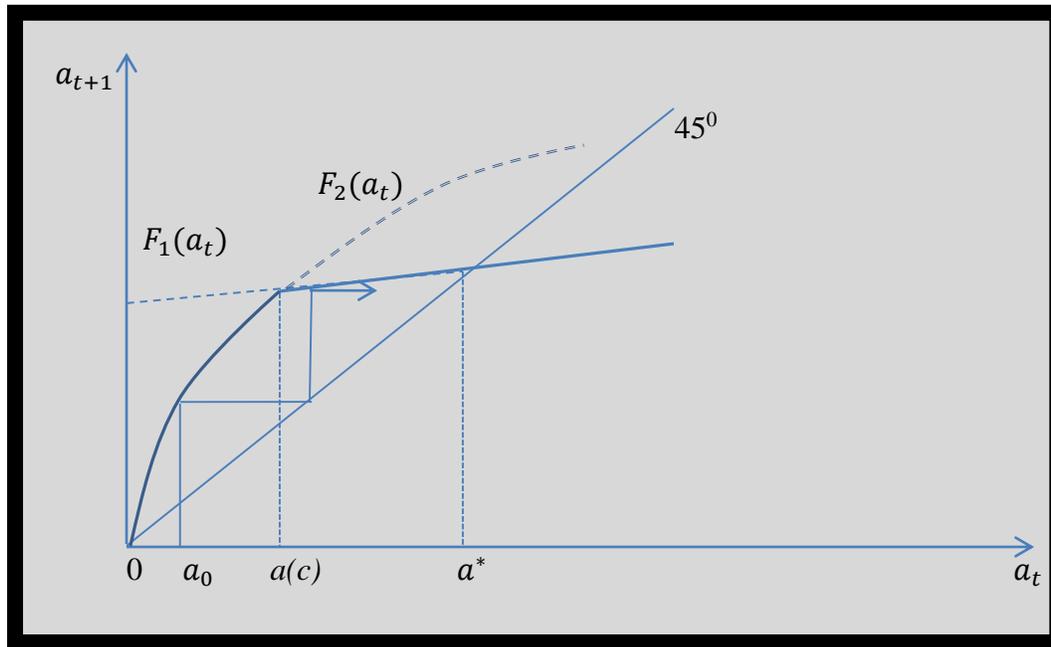
section begins by discussing the relationship between financial development and economic growth as conceptualised in Patrick's Stage-of-development finance-growth theory. Theoretical and empirical studies that have sought to test these theories are then reviewed. Given that this latter evidence is quite voluminous, the focus here will be on developing countries. The final part of this section considers the paucity of empirical work that assessing the Patrick's stage-of-development theory.

2.3.1 Stage-of-development Theory

The stage-of-development finance – growth theory, as hypothesised by Patrick (1966) maintains that the relationship between finance and growth varies over time as the economy develops. In its initial stages, financial development will lead economic growth; however, as real growth takes place in the economy this link becomes less important and growth will induce the demand for greater financial services. According to this theory, the direction of causality between financial development and economic growth changes over the course of the development (Patrick, 1966: 174-189). Financial development is able to enhance real innovation in investment before sustained modern economic growth gets under way and as such growth occurs, the supply-leading impetus gradually becomes less and less important while the demand-following response becomes more dominant.

Aghion et al. (2005) hypothesised that in Schumpeterian models that the growth rate (g) of the technology frontier is determined by the pace of innovation and stage of development in perfect credit markets. They went further to interpret economies where the cost of defrauding a creditor is higher, as countries with more highly developed financial systems. The reason for this is that among the services performed by well-functioning financial intermediaries and markets are the detection and prevention of fraud. Countries will then fall into one of the three groups defined by the value of their finance multiplier, which is an increasing function of the cost of defrauding a creditor (an indicator of financial development). The evolution of the stages of development is illustrated for each case in Figures 1- 3 below.

Figure 3: A country with the highest level of financial development.



Source: Adapted from Aghion et al. (2005).

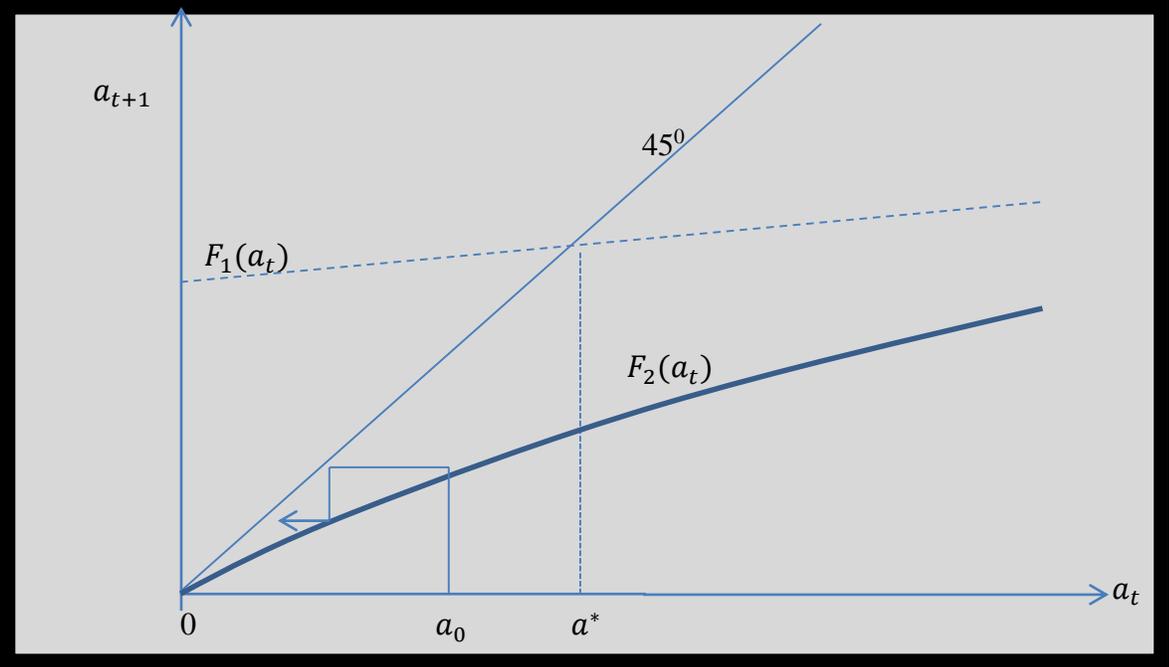
Figure 3 above shows that the country will grow at the same rate as the technology frontier \bar{a}_t in the long run. Increases in financial development will have no marginal effect on the economic growth rate as the economy develops. These will simply converge to the values of a^* which are independent of financial development.

1. Convergence in technological and economic growth rate, with no marginal effect of financial development.
2. Convergence in technological and economic growth rate, with a level- effect of financial development. In the long-run as the economy develops to an advanced stage of development, financial development will be as follows:

Figure 4 indicates that country will also grow at a medium rate in the long run as it passes through different stages of development because income per capita is strictly proportional to \bar{a}_t . Increases in financial development will have no marginal effect on the growth rate of the economy but will have a positive marginal effect on the stage of development

effect on the level of per capita GDP relative to the frontier. Lastly, the growth rate of a country that fails to converge with the frontier growth rate increases with its level of financial development. This implies that the relationship between the economic growth rate and financial development is a multi-tiered one that takes different directions and shapes as a country goes through different stages of development as in Patrick (1966) hypothesis (Aghion et al. 2005)..

Figure 5: The lowest level of financial development.



Source: Adapted from Aghion et al (2005)

In essence the above model illustrates that the effect of financial development on economic growth should be positive up to some critical level F_g and zero thereafter. The effect of financial development on the level of per capita GDP should be positive up to some critical level F_y and zero thereafter, with $F_g < F_y$ (Aghion et al. 2005). This implies a zero effect on growth levels beyond some threshold, and that this threshold is greater than the growth threshold F_g . In this study I sought to challenge these predictions using time series evidence on financial development and economic growth.

Patrick’s stage-of-development theory is underpinned by two hypotheses; the supply-leading and the demand-following hypotheses (Ziwenga et al., 2011). The supply-leading hypothesis postulates that the development of the financial system will lead to economic growth, while the

demand-following hypothesis posits that as real growth takes place in the economy, it sparks the demand for financial services. Firstly, the conventional view of the supply-leading hypothesis postulates that the direction of causality flows from financial development to economic growth (Schumpeter, 1912; Levine, 1997; Luintel, 2008). Luintel (2008) holds that a well-developed financial sector provides critical services to reduce those costs and thus to increase the efficiency of intermediation. Such a financial sector mobilises savings, funds good business projects, facilitates the diversification of risks, and fosters the exchange of goods and services. These services result in a more efficient allocation of resources, a more rapid accumulation of physical and human capital, and faster technological innovation, thus inducing faster long-term economic growth (Levine, 1997).

Secondly, the demand-following hypothesis postulates that economic growth leads to financial development. The development of the real economy spurs increased demand for financial services, which in turn generates the introduction of new financial institutions and markets to satisfy this demand (Robinson, 1952; Patrick, 1966; Stern, 1989). Stern (1989) argues that financial development follows economic growth. Robinson's assertion that "where enterprise leads finance follows" (Robinson 1952: 86) indicates that economic growth causes financial development.

A considerable number of finance- growth theories for and against the stage-of-development theoretical propositions exists. Some of these are the Keynesian monetary growth models, the Mackinnon and Shaw models, the exogenous and endogenous growth model, and the neo- classical models (Wood, 2012). Both the Keynesian monetary growth models and the Mackinnon and Shaw models support the supply-leading and demand-following hypotheses; however, they differ markedly on the role of government and interest rates in the financial market (Christopolous and Tsionas, 2004).

Keynes affirmed that there is a historical and natural tendency for real interest rates to rise above their full employment equilibrium level and that this should necessitate government intervention to reduce these rates and stimulate growth (Levine, 2008). In the model of money and economic growth, Tobin (1963) supports the growth-enhancing implication of low and regulated interest rates. It was noted in the same model that since households have two assets (money and productive capital) the higher the return on capital relative to money, the more capital households will hold

relative to money. This produces high capital/labour ratios, high labour productivity and hence high economic growth rates. Reducing interest rate, which is the return on money, will therefore increase the pace of economic growth (Dasgupta et al. 2013).

At the other end of the spectrum, the McKinnon Shaw School focuses on financial repression-controlled interest rate and high reserve requirements policies (Ogwumike, and Afangideh, 2008). This school of thought argues that financial development policies are harmful to long term growth because they reduce the volume of funds available for investment (Odhiambo, 2011). Both McKinnon (1973) and Shaw (1973) contend that controlled lending and deposit rates lead to non-price rationing of credit resulting in repressed financial systems and minimal growth. They affirmed that financial reforms that liberalise the financial market enhance greater financial development. In addition financial liberalisation would not only propel efficiency of financial allocation of credit from unproductive to the productive sectors, but would deepen the financial sector savings role through a positive real interest rate. This is called the complementarity hypothesis between real money balance and investment.

Essentially, under this hypothesis, exogenous liberalisation reforms results in positive interest rates, which in turn boosts savings liabilities and credit allocation efficiency that eventually translates into real investments. This further increases output and economic growth in the country. Studies on endogenous growth models have reached similar conclusions, finding that financial intermediation has a positive effect on steady-state growth (Ogwunike and Sasilu, 2014; Greenwood and Jovanovic, 1990; Pagano, 1993) and that government intervention in the financial system has a negative effect on the growth rate. In addition, the endogenous growth theory predicts a positive relationship between real income, financial depth and real interest rates (King and Levine, 1993).

On the other hand there is a fast growing category of finance- growth theories (neo-classical model and endogenous growth model) that stood to challenge the stage of development theorem (Black 1986:35-37). These theories hold that in the traditional model of resource allocation, firms and households interact through markets with financial intermediaries playing no role (Diamond and Dybvig, 1983). The neo-classical theory is built on models of resource allocation which are based on perfect and complete markets. Abu-Mhareb (2011) mentions one such model: the Arrow

Debreu Model put forward by Diamond and Dybvig (1983). This model assumes that efficient resource allocation and perfect markets play a vital role in enhancing economic growth.

Solow (1956) hypothesised that in the neoclassical model of perfect markets, the following criteria usually must be met: no individual entity can influence prices; conditions for borrowing or lending are equal for all entities under equal circumstances; there are no discriminatory taxes; absence of scale and scope economies; all financial titles are homogeneous, divisible and tradable; there are no information costs, no transaction costs and no insolvency costs; all market parties have ex ante and ex post immediate and full information on all factors and events relevant to the (future) value of the traded financial securities.

Menyah et al (2014) argues that the Arrow-Debreu model is based on the paradigm of complete markets. In a model of complete markets, present value prices of investment projects are well defined. Savers and investors find each other because they have access to perfect information on each other's preferences at no cost, in order to exchange savings against readily available financial instruments. These instruments are constructed and traded without cost and they meet the needs of both savers and investors fully and simultaneously (Bolbol et al. 2005). In this way each possible future state of the world is fully covered by a so-called Arrow-Debreu security which is a state contingent claim. Also important is the fact that the supply of capital instruments is satisfactorily diversified so as to provide the possibility of full risk diversification and market parties have homogenous expectations and act rationally. The role of intermediaries is only to bring savers and investors together and to create instruments that meet their needs (Waqabacca, 2004). For this reason intermediaries are at best eliminated in a move towards market perfection with all intermediaries becoming redundant, resulting in a perfect state of disintermediation.

In validating the argument against the stage of development theory, the Harrod-Domar (1946) neo-classical growth model for a closed economy proposed that the ratios of national savings and national capital-output stimulate the growth rate of the gross national product (GNP). As such, the expansion of new capital stock through investment takes place only when these economies save a portion of their national income. This new investment generated through savings will foster economic growth. The neo-classical theory considers productivity, capital accumulation, population growth and technological progress as the major driving forces explaining long-run

economic growth. In Solow's (1956) growth model, the importance of savings and capital investment in promoting economic growth is emphasised. His premise was that the capacity of an economy could be expanded if society saved part of its resources and used this to build into the future.

The most recent contradiction to the growth literature is the endogenous growth model, in which investments in research and development and in physical and human capital are major determinants of economic growth (Craigwel et al. 2012). Woods (2012) and Odhiambo (2008) supports this, observing that this model contrasts the stage of development economics. It posits that entrepreneurs can affect the growth creation process, as innovation and knowledge are achieved through institutional research and development activities. In his endogenous growth framework Winkler (2009) explains how a well-researched, efficient operation leads to economic growth. This implies that ensuring efficient institutional operations is critical to economic growth in Zimbabwe.

Contemporary literature contends that three schools of thought exist that confirms theoretical assumptions of the stage-of-development hypothesis in the banking sector-economic growth link, while taking into consideration the complementary effects of stock market development (Odhiambo, 2008). The first school of thought validates the feedback hypothesis by maintaining that the banking sector, the stock market and economic growth promote each other. Proponents of this view include Chauh and Thai (2004), Kar and Pentecost (2000), Goldsmith (1969) and Luintel and Khan (1999). According to Chauh and Thai (2004), a country with a well-developed banking system and stock market promotes economic growth through technological changes and product innovation, which in turn creates high demand for financial arrangements and services. These changes further stimulate greater economic growth, as both the banking sector and the stock market responds to demands for financial services (Kar and Pentecost, 2000).

The feedback hypothesis has been further supported by such empirical studies by Kolapo and Adaramola (2012), Osuji and Chigbu (2012) and Samson and Elias (2010). Samson and Elias (2010) tested the competing finance-growth hypothesis using Granger causality tests in a VAR framework. The results suggested bidirectional causality between financial development and economic growth. Kolapo and Adaramola (2012) examined the impact of a capital market on

economic growth in Nigeria. The causality test results suggested a bi-directional causation between economic growth and the value of transactions on the stock market and a unidirectional causality from market capitalisation to economic growth. Osuji and Chigbu (2012) employed the Granger Causality test, Co-integration and Error Correction Method (ECM) to investigate the impact of financial development on economic growth Nigeria. The Granger test indicate a bi-causality between Money Supply (MS) and Economic Growth (GDP).

The second school of thought supports the supply-leading hypothesis in postulating that the banking sector needs to be complemented by stock market development in promoting economic growth (Allen et al, 2012; Tsaurai, 2013, 2015, 2016). Acaravci et al., (2007) confirmed this hypothesis and documented that emerging stock markets are crucial to developing countries, since they augment bank finance by providing equity capital to the disadvantaged sectors of the economy. Furthermore Tsaurai (2015) affirms the supply-leading hypothesis by highlighting that emerging markets need not be fearful of stock market development, since the functioning of stock markets results in a higher debt-to-equity ratio, more business for banks eventually boosting economic growth (Kadenge and Tafirei, 2014; Ishioro, 2013; Allen et al, 2012).

Kadenge and Tafirei, (2014) concurs that if economic growth is to be accelerated banks need to be complemented by a well-functioning stock market in order to reduce the inefficiencies associated with developing countries' weak credit markets,. A study by Tsaurai and Odhiambo (2012) investigated the causal relationship between stock market development and economic growth in Zimbabwe. The empirical result reveals that there is a distinct causal flow from stock market development to economic growth – without any feedback in Zimbabwe. The study also discovered a unidirectional causal flow from savings to economic growth and from stock market development to savings.

Other studies have further validated the supply-leading hypothesis, and these include King and Levine (1993), and, Christopoulos and Tsionas (2004). Similarly, Akinlo and Egbetunde (2010) while examining the long-run causal relationship between financial development and economic growth in ten sub-Saharan countries found that financial development caused economic growth in four countries, while growth Granger caused financial development in one country. The results of the remaining five countries supported bi-directional causality.

In the same way, in a study which used West-African countries (Owusu, 2012) found supply-leading relationships in three countries, while growth caused financial development in one; and bi-directional causality in two countries. The findings from a study on the relationship between financial development and economic growth in Sierra Leone support the supply-leading hypothesis (Kargbo and Adamu, 2009). Allen et al (2012) found a positive relationship between financial intermediation and economic growth, while some others provide evidence in favour of the demand-following hypothesis (Lucas, 1988; Stern, 1989; Odhiambo, 2008; Shahnoushi et al. 2008; Tsauroi, 2012).

The third school of thought provides evidence in favour of the demand-following hypothesis, stipulating that economic growth plays a leading role in enhancing stock markets development, and that banks are only there to complement these development. Studies consistent with this view include those by Phadran et al (2014), Waqabaca (2004), Zang and Chul- Kim (2007), and Agbestiafa (2003). Zang and Chul- Kim (2007) stress that economic growth plays a leading role and banks merely complement the promotion of stock market development by ensuring the liquidity of real innovative investments. This is in agreement with Agbestiafa (2003), who further notes that liquidity of the stock market is promoted by a boost in investment and economic growth and that shares become easily acceptable as collateral for bank lending in the banking sector. Economic growth is facilitated by liquid stock markets, which increase the incentives to obtain information on firms, thereby improving corporate governance (Phadran et al. (2014). Waqabaca (2004) observes that economic growth boosts a bank's balance sheet as a result enhances GDP per capita.

When testing the relationship between financial development and economic growth in Fiji, Waqabaca (2004) found a positive relationship between financial development and economic growth, but with the direction of causality running from economic growth to financial development. On the other hand Agbetsiafa (2003) when examining the causal relationship between financial development and economic growth in a sample of eight (8) emerging economies in Sub-Saharan Africa (SSA), found a dominant unidirectional causality from growth to finance in Ivory Coast and Kenya.

2.4 CHAPTER CONCLUSION

As revealed in multiple theoretical views outlined in the foregoing review of related literature on finance-growth, it appears that a broadly positive correlation between financial intermediation and economic growth exists but there is still no consensus on the direction of this causality. Progress has been achieved in terms of econometric methodology, with research paying more attention to nonlinearities and heterogeneities in this field of research. It seems however that no breakthrough papers have yet appeared. Rather, progress is slow and researchers sometimes seem to be going round in circles (Tsauroi, 2017). However, the debate on the relationship between financial development and economic growth has recently received attention in several empirical studies in both developed and developing countries. The thrust of this debate has been whether financial sector development granger causes economic growth (supply-leading hypothesis), or it is the growth of the real sector which granger causes financial sector development (demand-following hypothesis). A large body of literature has emerged, both at the theoretical and the empirical level, attempting to answer these questions with no success. In order to follow this trend this study strives to provide answers to the finance–growth dilemma by further estimating the nature direction and magnitude of the nexus between the banking sector, the stock market and economic growth. Chapter 3 discusses the various methodologies used in data analysis and empirical research.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter expands the investigation of the nexus between banking sector, stock market development and economic growth by focusing on three major aspects of the study: hypothesis development, data sources and methodological issues and, research design and estimation techniques. The rest of the chapter is structured as follows: section 3.2 discusses the development of hypotheses to be tested while section 3.3 specifies the data sources and methodological issues. In this section methodological issues arising from the use of numerous econometric techniques and all other variables used in testing the direction of causality between banking sector, stock market development and economic growth are specified. In section 3.4 the econometric models that were used to test the hypotheses are specified and in section 3.5 robustness testing techniques are discussed. Lastly section 3.6 concludes the chapter by highlighting the major issues raised and a preview of chapter 4 (preliminary data analysis) is also provided.

3.2 HYPOTHESIS DEVELOPMENT

In order to ensure high levels of estimation accuracy in testing the relationship between banking sector, stock market development and economic growth while at the same time endeavoring to improve the precision of the estimation models used, three hypotheses were formulated as follows:

Hypothesis 1: There exists a causal relationship between banking sector, stock market development and economic growth in Zimbabwe.

The positive view of the finance-led growth hypothesis focuses on the contributions made by financial development to the mobilisation of domestic savings and investment through a more open liberal financial system. This line of argument formed the basis of the first hypothesis tested in the Zimbabwean economy. Some of the main adherents of this view include (Enisan and Olufisayo 2009; Hassan et al. 2011; Levine, 2008; Ishioro, 2013; Dasgupta et al. 2013).

The first hypothesis can be said to have been informed by the theoretical stipulations of conventional view of Chauh and Thai (2004). The conventional view of the supply-leading hypothesis postulates that the direction of causality flows from financial development to economic growth. Dasgupta et al. (2013) conclude that financial development leads economic growth. Ishioro (2013) showed that in Zimbabwe, the level of financial intermediation is a good and

reliable predictor of long-run rates of economic growth, capital accumulation and productivity. Levine (2008) argues that in less developed countries, well-developed stock markets can easily lead to economic growth through their enhanced liquidity as the investors diversify their risk in various shares creating a portfolio with high return investments and as a result boosts productivity levels. This argument by Levine (2008) engendered the formulation of the first hypothesis since it underscores and supports the finance-led view as in Enisan and Olufisayo (2009), Hassan et al. (2011), Menyah et al. (2014) and Tsauroi (2016).

In contrast, Shan and Morris (2002) revealed that the hypothesis was supported in only a few of the countries they surveyed and therefore, no general conclusions could be drawn. The lack of conclusions not to mention the mounting arguments on finance–growth relationships has been the major factors underpinning the formulation of the hypothesis that banking sector and stock markets development cause economic growth (Tsauroi, 2017). This null hypothesis would be rejected if an alternative hypothesis of no causal relationship between the variables was to be accepted. Thus the study undertook to conclude this long debated issue by determining the direction and magnitude of the finance-growth nexus.

The alternative hypothesis thus follows the theoretical stipulations of Blackburn et al. (2005) and Yucel (2009). Yucel (2009) supported the demand-following hypothesis which postulates that economic growth leads financial development. According to this hypothesis, the development of the real economy induces increased demand for financial services. The introduction of new financial institutions and markets would then satisfy the increased demand for financial services (Kar and pentecost, 2000; Panopoulou, 2009; Tsauroi, 2015).

Hypothesis 2: There exists a significant causal relationship between banking sector and stock market development in Zimbabwe.

This hypothesis has its key underpinnings in theoretical and empirical literature which posits that the relationship between banking sector and stock market development in less developed countries has for years been a subject of great interest and debate among theorists (Bangake and Eggoh, 2011; Herwartz and Walle, 2014; Mukhopadhyay et al. 2011). What remains unclear however, is the issue of correlation and causality between banking sector and stock market development. It is against this background of inconclusive theoretical postulations that this study has tested the

hypothesis that there is a significant causal relationship between banking sector and stock market development in Zimbabwe.

A number of empirical and theoretical studies have supported the view that well-functioning stock markets can significantly boost banking sector development through liquidity enhancement, risk diversification savings mobilisation and corporate control (Mukhopadhyay et al. 2011; Bolbol, 2005; Allen and Gale, 2000). Given the important role of stock markets and banks in promoting economic growth in both developed and developing countries, most researchers including Beck and Levine (2004), Ndako (2008), Abu-Mhareb (2011) and Blackburn et al. (2005) are now modelling stock market and banks concurrently with economic growth in their empirical work. What remains unanswered is the question of causality and the correlation and robustness of the relationship between banking sector and stock market development.

On the other hand, Dey (2005) has argued that no direct empirical evidence of a significant relationship between banking development and stock market activities exists in less developed economies. This argument forms the basis for the formulation of the alternative hypothesis which would have been accepted if the relationship between banking sector and stock market development was not significant. Studies in support of the alternative hypothesis emphasise the positive role of banks while stressing the shortcomings of market-based financial structures. Proponents of this theoretical view include Levine (2000), Solo (2013), Ishioro (2013) and Beck and Levine (2004). Against this background of inconclusive views and ongoing debate on the direction of causality, correlation and robustness of the relationship between banking sector and stock market development the study sought to validate or disprove the formulated null hypothesis.

3.3 DATA AND METHODOLOGICAL ISSUES

3.3.1 Data sources

The study used annual time series data from the World Development Indicators (WDI), Reserve Bank of Zimbabwe (RBZ) and Zimbabwe Central statistics (ZimStats) from 1988 to 2015. Tsauroi (2015) believes that secondary time series data sources (like the ones used in the present study) are most appropriate since they provide a fairly long data set, which is necessary when testing long multi-variant finance-growth nexuses. The study thus follows the suggestions made by Herwartz and Walle (2014) in applying a fairly long time series data set obtained from secondary sources.

According to Owusu (2012) a fairly long time-series data set was used because the granger causality test must be done for various periods which require data of such characteristics. Therefore the nature and characteristics of this data set made it suitable for the causality tests that were applied in this study. Moreover, such secondary sources (WDI, RBZ, ZimStats) were chosen also because they contained data on financial development indicators from 1980-2015 in US dollars, making them ideal to test the research hypothesis developed herein. Such US dollars denominated data helped mitigate the effects of outliers, variability and instability in data caused by the hyperinflationary environmental effects that characterised the Zimbabwean economy during the period under study.

The study used macroeconomic data on Zimbabwe from 1980 to 2015: this period was chosen because it covers both the financial repression and financial liberalisation phases which the Zimbabwean economy experienced (Ishioro, 2013). As far as time series data are concerned, the period was long enough to establish whether a relationship existed between the variables under study. Moreover with data covering almost three decades, the period was adequate to examine the long run relationship between finance and growth as it enables full coverage of all trajectories of data decomposed into three periods: post-independence (1980-1990), pre-liberalisation (1991-1993) and post-liberalisation (1994-2015) (RBZ, 2015).

Zimbabwe was chosen as a case study since there was a great deal of evidence from empirical studies revealing that the causal relationship between Zimbabwean financial sector development and economic growth had not received enough attention (Kadenge and Tafirei, 2014). Tsauroi (2013) adds that most empirical studies have examined the casual relationship between stock market and economic growth but only a few (if any) have included Zimbabwean banking sector development in their analysis. This provides an indication of an untapped area in the relationship between banking sector, stock market and economic growth, which requires advanced econometric research.

3.3.2 Measurement of variables

In the literature on finance there are myriad proxies with which to estimate the level of banking sector development. For example, one could use any of the following: the total credit issued to the

private sector by deposit taking banks divided by GDP; liquid liabilities divided by GDP, deposit money bank assets divided by GDP; broad money divided by GDP; banks assets, total credit or frequency of systematic banking crises (Badun, 2009). Several finance growth studies have used the ratio of total credit to private sector divided by GDP to proxy banking development. Such studies include those by Aghion et al. (2005), Masten et al (2008), Coricelli and Roland (2008), Owusu (2012), Odhiambo (2011) and Pradhan et al. (2014). Their views are consistent with those of Pradhan et al. (2014) who postulate that total credit to private sector divided by GDP best approximates the process of improvements in the quantity, quality and efficiency of banking services. Tsaurai and Odhiambo (2013) augmented that this process involves the interaction of many activities, it cannot consequently be captured by a single measure. Studies consistent with this view include those by Banos et al. (2011) and Abu-Bader and Abu-Qarn (2008) who revealed that banking sector development can be precisely estimated by using a combination of proxies, credit to private sector divided by GDP included.

Beck (2011) observes that banking sector development is often measured by using the value of loans made by banks divided by GDP. The use of banking credit to private sector (BCP) as an indicator of financial development has some advantages over other variables. More importantly, it excludes credit to the public sector as well as credit issued by the central bank. Thus, it represents more accurately the role of financial intermediaries in channeling fund to private market participants. Gries et al. (2009) argued that BCP has a clear advantage over other measures of monetary aggregate such as M1, M2 and/or M3 in that it reasonably captures the actual volume of funds channeled to the private sector. This financial indicator (BCP) has been used previously in investigating the relationship between financial development and economic growth in Nigeria (Nzotta and Okereke, 2009). The ratio of BCP/GDP is interpreted as an indicator of more financial services and, therefore, greater financial intermediation.

Other studies have employed numerous monetary aggregates to proxy banking sector development. These include the ratio of M2 to GDP, the interest rate margins, banking assets to GDP and banks' deposit liabilities. These measures are preferred usually as a result of their availability and the fact that they have been widely used in other studies investigating similar causal relationships (Odhiambo, 2008, 2004; Wood, 1993; Lo, 2005). Lo (2005) found that the ratio of M2 to GDP is a monetisation measure that is suggestive of the liquid form of monetary

aggregates which are related to the ability of the financial system to provide liquidity or act as a medium of exchange. That is, it captures the size and depth of financial markets. Odhiambo (2008) agrees and further argues that when using the ratio of broad money to GDP as a measure of financial depth, a higher ratio implies a greater financial intermediary development. Nonetheless, this monetisation proxy may only capture liquidity and not how well this liquidity is being channeled to other sectors in the economy (Odhiambo, 2004; Tsaurai 2015). As such, total financial sector credit (loans and advances to both private and public sectors) to GDP variable reflects the role of financial intermediaries in transferring funds to various sectors of the economy.

Salisu (2014) has documented that the ratio of broad money to GDP ($M2/GDP$) is the standard measure of financial depth. However, as mentioned by Kar and prentecost (2000), this ratio measures the extent of monetisation of the financial sector rather than of financial depth. Gries et al. (2009) also argue that in developing countries, monetisation can increase without financial development occurring. In line with this argument, this ratio $M2/GDP$ is not regarded as an entirely satisfactory indicator of financial depth and therefore, an alternative financial depth measure should be used. Abu-Bader and Abu-Qarn, (2008) stipulated that a ratio of total bank deposit liabilities to nominal GDP (that is deducting currency in circulation from $M2$) perfectly and squarely fits as an alternative.

Banks deposit liabilities (BDL), are a measure of financial depth, which is calculated by taking the difference between total liquid liabilities and currency in circulation divided by nominal GDP (Nzotta and Okereke, 2009). When using this ratio, a higher value implies a greater financial intermediary development in the economy. Using the overall size of the banking sector asset accumulation to indicate banking sector development, Chow and Fung (2011) examined the causal relationship between and amongst banking sector development, stock market and economic growth and added further weight to the view that this proxy is superior and succinct in estimating financial development.

Another proxy for financial development used by researchers is the interest rate margins (INT). Interest rate margins (INT) are typical measures of the efficiency of the banking sector and are computed by finding the difference between deposit and lending rates in the banking sector (Dey, 2005). Interest rates margins have an impact on the general price level and have been selected as

a control variable since they could affect money, credit and GDP (Kolapo and Adaramola, 2012). Al-Fayoumi (2009) insists that short-term lending interest rate (IR) is included because of its influence on economic growth. It is the main factor affecting credit and in turn influences investment projects and then economic growth. The main reason behind selecting the lending interest rate rather than gross fixed capital investment, human capital and foreign direct investment in this study was their availability on a quarterly basis.

Following the empirical studies of Beck and Levine (2004) and Levine et al. (2000), this study uses the value of loans made by commercial banks to the private sector divided by GDP at constant price and calls this proxy, bank credit to private sector (BCP). This measure is believed to be superior to other measures of financial development. It represents an accurate and reliable indicator of the functioning of financial development as it is a measure of the quantity and quality of investment (Odhiambo, 2008; Tsauroi, 2017). Although it excludes bank credits to the public sector, it represents more accurately the role of financial intermediaries in channeling funds to private market participants. This was consistent with the objective of this study which was to evaluate the contribution of banks and stock markets to economic growth in Zimbabwe (Owusu, 2012).

Approximation of stock market development involves the interaction of many activities and cannot be captured by a single measure. Studies consistent with this view include Darrat et al. (2006), Hou and Cheng (2010), Salisu (2014) and Kadenge and Tafirei (2014). These researchers agree on the notion that measuring the process of improvement in the quantity, quality and efficiency of stock market services has never been dealt with meticulously by considering one single proxy. Hou and Cheng (2010) added that, in order to assess the nexus between stock market development, banking sector and economic growth, three indicators are employed in literature: measures of size (market capitalisation) and liquidity (value traded and turnover ratio).

Studies by Caporale et al. (2005), Cheng (2012), Cooray (2010) and Kar and Pentecost (2000) advocated for measures of size (market capitalization) as a proxy for stock market development. Caporale et al. (2005) content that market capitalisation (MC) is a proxy that measures the extent to which stock market allocates capital to investment projects and the opportunities for risk diversification that this provides to investors. Cooray (2010) adds that market capitalisation also

shows the overall size of the stock market as a percentage of GDP at constant price. MC equals the value of listed domestic shares on domestic exchanges divided by GDP (Cheng, 2012).

On the other hand, studies exist that support measures of liquidity (total value traded (VT) and turnover (TR)) as indicators of financial market development (Pradhan et al. 2014; Solo, 2013; Owusu, 2012; Tsauroi, 2012). The former measures the investor's ability to trade economically significant positions on a stock market, whereas the latter is an indicator of the liquidity of assets traded within a market (Pradhan et al. 2014). Tsauroi (2013) adds that total value traded (VT) is the total value of domestic shares traded on a country's stock exchange as a share of GDP at constant price.

According to Tsauroi (2012) the measures of market liquidity complements the market capitalisation ratio thus even though a market may be large, there may be thin trading. Rousseau and Wachtel (2000) and Beck and Levine (2004) both use total value traded measured as the ratio of value shares traded to GDP. However, according to Beck and Levine (2004), the value traded has two weaknesses: It does not measure the liquidity of the market and it only measures trading relative to the size of the economy. In addition, since value traded is the product of quantity and price, this means that it can rise without an increase in the number of transactions. A high value for total value traded may result from high trading activity in certain active stocks, while there may also be a significant number of relatively inactive shares listed on the same stock exchange (Beck et al., 2000).

Given such weaknesses, a better indicator of stock market activity is the turnover ratio (TR). Adherents of this view-point include Beck and Levine (2004), Owusu (2012), Solo (2013), Beck (2008), Nowbutsing and Odit (1999) and Odhiambo (2010). Beck (2008) and Nowbutsing and Odit (1999), postulated that turnover ratio (TR) equals the value of total domestic shares traded on domestic exchanges, divided by the value of listed domestic shares or market capitalization (MC). Tsauroi (2016) expands on this, arguing that turnover specifically, measures the volume of domestic equities traded on domestic exchanges relative to the size of the market. Beck and Levine (2004) prefer this proxy to other measures of stock market variables since, unlike others the numerator and denominator of TR contain prices irrespective of the fact that, TR complements the MC ratio (Owusu, 2012). A large but inactive market will have a large MC ratio but a small TR

ratio. This also complements the value-traded ratio: while this total-value-traded ratio captures trading relative to the size of the economy, turnover measures trading relative to the size of the stock market. A small liquid market will have a high TR ratio but a small value traded ratio (Nowbutsing and Odit, 1999).

In order to examine the nexus between stock market development, banking sector development and economic growth in this study, the stock market capitalisation ratio, among others was used. The use of stock market capitalisation was motivated by the methodologies used in previous researches on finance and growth (Nowbutsing and Odit, 1999; Odhiambo, 2010). The assumption underlying this measure is that overall market size is positively correlated with the ability to mobilise capital and diversify risk on an economy-wide basis (Levine, 2008). The motivation for using the index factor is to ensure that all the various policies implemented to reach full stock market development in Zimbabwe are taken into account. The use of this index factor also goes some way solving the problem of the quantification of the effect of financial market development, which is often one of the challenges associated with empirical studies in this discipline (Dasgupta et al. 2013).

This researcher also followed Beck et al. (2000) and Beck and Levine (2004) by deflating the MC ratio a stock variable measured at the end of the period. The real GDP needed to be deflated too, although it represented a flow variable that was defined relative to a period. This indicated that there was a stock-flow problem: thus it is a process which, if ignored may have resulted in a misleading result. The problem was solved by deflating end of year market capitalization by end of year consumer price index (CPI) and deflating the GDP by the CPI (Darrat et al., 2006). The study then took the average of MC in period t and period $t-1$ and related it to the real flow variable for period $t-4$.

Using standard practices described in the growth literature (Yucel, 2009; Cheng, 2012), economic growth was measured by real gross domestic product (GDP). As such this study used real GDP as a proxy for economic growth when testing the relationship between economic growth and financial development. Levine (2008) suggests several possible indicators for economic growth: real per capita GDP growth; average per capita capital stock growth; and productivity growth. In the estimation of causal relationship between banking sector, stock market development and economic

growth, this study used real GDP per capita with a one-year lag as initial income per capita to control for the steady-state convergence growth model (Cheng, 2012). Furthermore, in order to estimate the nexus between stock market and banking sector developments, the study controlled for a deterministic time trend in turnover and changes in the respective means of turnover and available bank credit as a result of differences in legal and institutional developments (Dey, 2005). As for the direction of causality, magnitude and robustness of the link between stock markets, banks and economic growth the researcher controlled for other potential determinants of economic growth in regressions (Naceur and Ghazouani, 2007).

Consistent with theoretical considerations in the extant finance- growth literature, the study employed financial sector credit (to proxy financial efficiency), broad money (M3) (to proxy financial depth) and banking credit to private sector (to proxy financial intermediation) as banking sector development variables. Stock market development was measured by turnover ratio (TR), value traded (VT) and stock market capitalization (MCAP) while economic growth was measured by real growth rate in annual gross domestic product.

3.3.3 Methodological issues

This section presents the weakness of the econometric models used in previous studies on finance and the growth nexus. In present study such weaknesses were exposed in an attempt to circumvent the impact of any problems they may have caused and subsequently to motivate and defend the use of the chosen econometric models.

Contemporary studies have shown that the application of estimates of financial development indicators can be biased for a variety of reasons, among them measurement error, reverse causation and omitted variable bias. A suitable estimation technique should be used if unbiased, consistent and efficient estimates of this coefficient are to be made (Badun, 2009). Odhiambo's (2011) study revealed that traditional causality tests suffer from two methodological deficiencies. Firstly, the granger estimation test does not examine the basic time series properties of the variables. If the variables are co-integrated, then these tests incorporating differentiated variables, will be misspecified unless the lagged error-correction term is included (Granger, 1988). Secondly, these tests mechanically turn the series stationary by differentiating the variables and consequently eliminating the long-run information embodied in the original form of the variables.

As observed by Levine (2008), a two-variable granger causality test without considering the effect of other variables is subject to possible specification bias: such causality tests are sensitive to model specifications and the number of lags. Empirical evidence from a two-variable granger causality may be biased when the number of endogenous variables is greater than two as a result of the restriction of other endogenous variables in the model. To this end, this study considered the Vector error correction (VEC) granger causality test that allows for several endogenous variables. The major weakness associated with the traditional Granger causality test is its sensitivity to the lagged terms included in the model (Odhiambo, 2008). Coporale et al. (2005) have argued that Granger causality in a two-variable relationship could be inconsistent owing to the problem of omitted variables. In addition, if the lagged terms included in the regression model are more than required, this may cause the estimates to be inefficient. In an effort to solve this problem an appropriate lag selection method was adopted as discussed below.

In a bid to ensure that appropriate lags were selected, the Akaike and Schwarz information criteria in the selection of suitable lag lengths was adopted. In contrast to the conventional granger causality method, the vector error-correction based causality test allows for the inclusion of the lagged error-correction term derived from the co-integration equation. By including this term, the long-run information lost through differencing is reintroduced in a statistically acceptable way.

In order to resolve the problem of the statistical weaknesses revealed in many of the studies reviewed above, this study adopted a multivariate estimation technique in the analysis of the relationship between variables. Specifically, this research used the dynamic Vector Error Correlation Model (VECM) with lagged values of the explanatory endogenous variables as instruments (Beck et al. 2000; Rioja and Valev, 2004). The study further made use of the (Auto Regressive Distributed Lag) ARDL approach since until recently, studies have showed that this approach has been preferred to other conventional co-integration approaches such as those by Engle and Granger (1988) and Gregory and Hansen (1996).

3.4 RESEARCH DESIGN AND ESTIMATION TECHNIQUES

This section discusses the analytical econometric models used to examine the relationship between banking sector, stock market development and economic growth. These estimation techniques were applied to test each of the research hypotheses developed herein. In this study testing of the

relationship between banking sector, stock market development and economic growth was carried out by employing the Vector Error Correction model (VECM) and the newly developed autoregressive distributed lag (ARDL) approach.

3.4.1 Main estimation technique: The VEC model

The vector error correction model (VECM) was used to estimate the hypothesis that there exists a significant causal relationship exists between and amongst banking sector, stock market development and economic growth in Zimbabwe. The VECM has several advantages over cross-sectional econometric variable regressions. In particular, the VECM controls for measurement errors not only of the financial development variables, but also of other explanatory variables. VECM on other hand was adopted for this particular study because using this model, once the variables are confirmed to be co-integrated it becomes easy to distinguish between the short run dynamics and long run causality (Odhiambo, 2007). According to Odhiambo (2009) the VEC inbuilt error-correction mechanism helps to distinguish between the short run and long run Granger causality directions. The approach employs only a single reduced form equation, thus eliminating the unnecessary estimation of numerous equations (Pesaran et al, 2001).

Yucel (2009) recommended the use of the VECM to examine whether stock market and banking sector changes could affect economic growth and to capture the complexities of the dynamic relations between the variables included in the model. The VECM consists of a system of equations that express each variable in the system as a linear combination of its own lagged value and the lagged values of all the other variables in the system. In this case it allowed the researcher to distinguish between the two types of granger causality: short-run and long-run. Long-run Granger causality from variable Y to variable X in the presence of co-integration was evaluated by testing the null hypothesis that the causal relationship would support the supply-leading view (financial development causes growth).

The model's empirical estimation followed three steps: The first step involved conducting unit root tests to examine the stationarity of time series variables. Since stationary was confirmed the second step followed, which involved examining the existence of long-run relationship between banks, stock markets and economic growth (Tsaurai and Odhiambo, 2012). The third was the establishment of a long-run nexus between variables. This involved conducting causality tests to establish the direction of the relationships between and among the banking sector, stock market

development and economic growth. The VEC methodology therefore sought to test the causal effect in the context of the research objectives and the formulated hypotheses using the model as specified below.

VEC model specification: The model specification for this study was informed by finance-growth theoretical literature including work by Mckinnon (1973), Shaw (1973), Liuntel and Khan (1999) and, Tang and Wang (2011). As argued in the Mckinnon-Shaw models, neo-classical aggregate production models and endogenous growth models, the complementarity between monetary variables and capital resources supports the significant positive nexus between national output and financial development (Mckinnon, 1973; Shaw, 1973). In order to assess the nexus between and among banking sector, stock market development, and economic growth, a combination of three stock market and three banking sector indicators were employed in the model. These included measures of size (market capitalisation), intermediation efficiency (total financial sector credit and banking credit) and liquidity (broad money M3, value traded, and turnover ratio) (Ndlovu, 2013).

In view of these considerations, the endogenous growth theory hypothesised a positive relationship between real income (GDP), stock market and banking sector development (King and Levine, 1993). Ogwumike and Salisu (2014) found that stock market and banking sector development promoted investment through provisioning of long-term capital, which in turn raised output and economic growth. Based on the above considerations and following Ogwumike and Salisu (2014), the study specified the model representing the relationship between banking sector, stock market development and growth as follows:

$$GDP_t = f (BSD, SMD)_t \quad (1)$$

where BSD is banking sector development, GDP is real gross domestic product and SMD is stock market development. The general form of the vector error correction model (VECM) was re-written in natural log form in order to remove any uncertainties in non-linear relationships between residuals and to allow coefficient interpretations as follows:

$$\ln GDP_t = \beta_0 + \gamma_1 ECT_{t-1} + \sum_{i=1}^k \beta_i \ln BSD_{t-i} + \sum_{i=1}^k \beta_i \ln SMD_{t-i} + \varepsilon_{1t} \quad (2)$$

where β_0 is a constant and β_1, β_2 and γ_1 are the elasticity coefficients of real GDP with respect to banking sector, stock market development and economic growth. ε_t is the Gaussian residual and ECT_{t-1} is the error correction term lagged one period. In this study estimating the nexus between banking sector, stock market development and economic growth involved carrying out the following steps:

Step 1: Determine the unit root tests and order of integration.

The first step in the estimation of the model investigating the statistical relationships between banking sector, stock market development and economic growth, was the determination of unit roots in the time series data. It was therefore important to check each time series variable for stationarity or unit root before conducting the co-integration analysis on the specified models. If the data were found to be non-stationary, the regression analysis performed in a traditional way would produce spurious results, thus stationarity needed to be confirmed first before any statistical modelling could be conducted. The study followed Elliot et al. (1996) and Tsaurai (2015) in employing the Augmented Dickey-Fuller (ADF) test, the Phillips and Peron (1988) test and a more accurate but efficient method of Dickey-Fuller the generalised least square (DF-GLS) autoregressive test.

The Augmented Dickey-Fuller (ADF) is a unit root test for time series where the equation below tests the unit root:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_{it-1} \sum_{i=1}^m \Delta y_{t-i} + \varepsilon_t \quad (3)$$

where y_t is the variable in question, ε_t is white noise error term and

$$\Delta y_{t-1} = (y_{t-1} - y_{t-2}), \Delta y_{t-2} = (y_{t-2} - y_{t-3}) \quad (4)$$

These tests were applied to determine whether the estimated δ was equal to zero or not. According to Odhiambo (2004), a cumulative distribution of the ADF statistics needs to be compiled in order to show that, if the value of the calculated ratio of the coefficient is less than critical value from ADF statistics, then y is said to be stationary. Nonetheless, Dejong et al. (1992), and Harris (1992),

revealed that this test was not reliable for small sample data sets because of its size and power properties. They showed that for small sample data sets, as in the case of this study, these tests seemed to over reject the null hypotheses when it was true, and accept it when it was false. This required a robust testing method such as the DF-GLS instead.

The DF-GLS is an advanced version of the conventional augmented ADF t -test as it employs generalised least squares (GLS), which de-trend the variable before running the ADF test regression. In comparison to the ADF tests, the DF-GLS test has the best overall performance in terms of sample size and power and has been used in many recent studies. Elliot et al. (1996) declared that it has substantially improved power when an unknown mean or trend exists. The regression test covers both a constant and a trend for the log levels and a constant with no trend for the first differences of the variables. If the order of integration was established as $I(1)$ the next step would be to conduct co-integration tests for the existence of long run relationships between and amongst the model series.

Step 2: Conduct co-integration tests

Once a unit root has been confirmed for a data series, the question is whether a long-run equilibrium relationship exists among variables. Having confirmed in this study that all variables included in the models were integrated of order one, the next step was to test independently for the existence of co-integration relationships between each of the proxies of banking sector development, stock market development and economic growth. For this purpose, the study used the Johansen (1988, 1991) and Johansen and Juselius (1990) co-integration test procedure. Multivariate co-integration analysis was conducted using the method developed by Johansen and Juselius (1990). The Johansen and Juselius multivariate co-integration technique uses a maximum likelihood estimation procedure, which allows the researcher to estimate simultaneous models involving two or more variables. This technique circumvents the problems associated with the traditional regression methods used in previous studies on the finance-growth relationship (Johansen and Juselius, 1990). If co-integration is detected between these variables, then the existence of Granger causality in either direction cannot be ruled out. The testing hypothesis is the null of non-co-integration against the alternative of existence of co-integration using the Johansen maximum likelihood procedure (Johansen (1991)).

The Johansen and Juselius multivariate co-integration technique applies the maximum likelihood procedure to determine the presence of co-integration vectors in non-stationary time series using trace(λ_{trace}) and the maximum eigen-value test statistics. The trace(λ_{trace}) and the maximum eigen value test statistics are used for testing the number of co-integrated vectors in non-stationary time series. The likelihood ratio statistic (LR) for the trace test (λ_{trace}) as suggested by Johansen (1988) is:

$$\lambda_{trace} = -T \sum_{i=r+1}^p \ln(1 - \lambda_i) \quad (5)$$

where: λ_1 = the largest estimated value of i th characteristic root (eigenvalue) obtained from the estimated Π matrix. $r = 0, 1, 2, \dots, p-1$, T = the number of usable observations. The λ_{trace} statistic tests the null hypothesis that the number of distinct characteristic roots is less than or equal to r , (where r is 0,1, or 2) against the general alternative. In this statistic, λ_{trace} will be small when the values of the characteristic roots are closer to zero (and its value will be larger in relation to the values of the characteristic roots, which are further from zero). Alternatively, the maximum eigenvalue λ_{trace} statistic as suggested by Johansen is

$$\lambda_{max}(r, r = 1) = -T \ln(1 - \lambda_{r+1}) \quad (6)$$

The λ_{max} statistic tests the null hypothesis that the number of r co-integrated vectors is r against the alternative of $(r+1)$ co-integrated vectors. Thus, the null hypothesis $r = 0$ is tested against the alternative that $r = 1$, $r = 1$ against the alternative $r = 2$ and so forth. If the estimated value of the characteristic root is close to zero then the λ_{max} will be small. According to Granger (1988), a set of variables Y_t , is said to be co-integrated of order (d, b) , if Y_t is integrated of order d and there exists a vector β , such that $\beta'Y_t$ is integrated of order $(d-b)$. Since co-integration had been confirmed the next step was then the determination of direction of causality between and amongst the variables.

Step 3: Conduct causality tests.

The granger multi-variate model was applied in accordance with the stipulations of the research objectives and as outlined in the hypotheses. The granger based VECM causality was used to test the hypothesis that a causal relationship between banking sector, stock market development and

economic growth. The granger test model was chosen for this study over other alternative techniques because of its favourable response to small samples like the Zimbabwean case being analysed herein. Odhiambo (2011), Owusu (2012) and Tsauroi (2015) have all shown that the granger test outperforms other methods in both large and small samples. The granger- based VECM procedure consists of a more powerful and a simpler way of ascertaining and specifically testing the direction and magnitude of the link between banking sector, stock market development and economic growth (Vazakidis and Adamopoulos, 2009). The general multi-variate causality model is expressed as follows;

$$\Delta \ln GDP_t = \alpha_1 + \delta_{11} ECT_{t-1} + \sum_{i=1}^{p-1} \alpha_{11i} \Delta \ln GDP_{t-i} + \sum_{i=1}^{p-1} \alpha_{12i} \Delta \ln BSD_{t-i} + \sum_{i=1}^{p-1} \alpha_{13i} \Delta \ln SMD_{t-i} + \varepsilon_{1t} \quad (7)$$

$$\Delta \ln BSD_t = \lambda_2 + \delta_{21} ECT_{t-1} + \sum_{i=1}^{p-1} \lambda_{21i} \Delta \ln BSD_{t-i} + \sum_{i=1}^{p-1} \lambda_{22i} \Delta \ln GDP_{t-i} + \sum_{i=1}^{p-1} \lambda_{23i} \Delta \ln MCAP_{t-i} + \varepsilon_{2t} \quad (8)$$

$$\Delta \ln SMD_t = \theta_3 + \delta_{31} ECT_{t-1} + \sum_{i=1}^{p-1} \theta_{31i} \Delta \ln SMD_{t-i} + \sum_{i=1}^{p-1} \theta_{32i} \Delta \ln BCP_{t-i} + \sum_{i=1}^{p-1} \theta_{33i} \Delta \ln GDP_{t-i} + \varepsilon_{3t} \quad (9)$$

where: SMD represents the stock market development indicator (represented by MCAP, VT, TR), $\alpha_1, \lambda_1, \delta_1, \theta_1$, are estimation coefficients, BSD is the measure for banking sector development (represented by M3, FSC, BCP), GDP is used to proxy economic growth, and ECT_{t-1} is the error correction term lagged one period. ε_t is the white noise error term. The model specification forces the long-run behavior of the endogenous variables to converge to their co-integrated relationships, while accommodating short-run dynamics. The dynamic specification of the model allows the deletion of the insignificant variables, while the error correction term is retained. The size of the error correction term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium state.

Upon establishing both long- and short-run dynamic causality behavior together with the equilibrium conditions of converging endogenous variables, the study went a step further to broaden econometric analysis by conducting a robustness test. This was done in order to eliminate

econometric weaknesses associated with most models, while endeavoring to enhance the accuracy of estimation techniques used in the study. The author thus adopted an extension of modelling in econometrics using a robustness estimation technique (the ARDL technique) to confirm and validate the results of the primary estimation technique (the VEC Model).

3.4.2 Robustness tests: The ARDL approach

In this study the autoregressive distributed lag (ARDL) approach was used to estimate the hypothesis that a robust causal relationship exist between and among banking sector, stock market development and economic growth in Zimbabwe. The ARDL technique was applied as a robustness testing technique because it is superior to conventional co-integration approaches. These conventional approaches have been condemned for their low power in testing unit roots, and the cycling nature of most of such series (Vazakidis and Adamopoulos, 2009). The ARDL approach employs only a single reduced form equation thus avoiding the unnecessary estimation of numerous equations (Pesaran et al., 2001).

In addition the study chose the ARDL approach as a robustness test following the theoretical restrictions of Pesaran et al. (2001). According to these authors, the ARDL model is most appropriate as a robustness test because it circumvents the inability to test, confirm and validate hypotheses with limited coefficients in the long run associated with the Engle-Granger method. Owusu, (2012) concurred and further augmented that compared to other estimation techniques (such as Engle-Granger (1988) technique, the Johansen maximum likelihood technique (1991-1995) and the Johansen–Juselius model (1990)), the ARDL F-bounds testing methodology has recently become the most preferred technique for co-integration (Shrestha and Chowdhury, 2007). The ARDL approach is more robust and efficient in small or finite sample sizes as used in this study than other methodologies (Ogwumike and Salisu, 2014). Odhiambo (2009) believes that the ARDL is applicable regardless of whether the underlying regressors are purely $I(0)$, $I(1)$ or mutually co-integrated. Banerjee et al. (1993) found that the ARDL integrates short- and long run dynamics without losing long-run data thereby avoiding problems arising from non-stationary time series data.

Nonetheless, when applying the test it is important to ensure that the variables under consideration are not integrated at an order higher than one. In the presence of $I(2)$ variables, the critical values

provided by Pesaran et al. (2001) becomes invalid. The consistency of the ARDL estimator depends on the validity of the instruments used in the model, as well as the assumption that the error term does not exhibit serial correlation. In order to test the validity of the selected instruments in this study, the researcher performed a test of over-identifying restrictions proposed by Dey (2005) and, Arellano and Bond (1991). In addition, checking for the presence of any residual auto correlation was carried out and finally, a stationarity test belonging to the first (Levin-2000) and second-generation unit root test was performed (Pesaran et al., 2001).

There are three main concerns when conducting ARDL granger-based causality tests: (1) the variables must be stationary; (2) the lag length should be appropriate; and (3) the problem of omitted variables must be addressed. With this in mind, the following four-staged procedure as outlined above should be adhered to. In the first step data are tested for auto correlation by using informal time series plots of the raw data and correlograms. Secondly, the data are tested for stationarity using formal checks of the Augmented Dickey Fuller (ADF) and the Phillips-Perron and KPSS unit root statistics. If the variables are found to have a unit root (non-stationary), this takes us to the third step which involves applying the F-bounds co-integration procedure. The F-Bounds testing procedure is used to test for co-integration to identify the number of co-integrating vectors in order that long run relationships can be determined (Shrestha and Chowdhury, 2007). As proposed by Pesaran and Shin (1999), equation for the ARDL F-bounds co-integration testing procedure can be specified and summarised as a general autoregressive model of order p , in Z_t as follows:

$$Z_t = c_o + \mu t + i = \sum_{i=1}^p \psi_i \Delta Z_{t-i} + \varepsilon_t \quad (10)$$

where $t = 1, 2, 3, \dots, T$. c_o represents $(k+1)$ lags of intercepts (drift) and μ denotes $(k+1)$ lags of trend coefficients. The following ARDL F-bounds co-integration model corresponding to the equation above is estimated as:

$$\Delta Z_t = c_o + \mu t + \Pi Z_{t-1} + \Gamma_i \Delta_{t-1} + \varepsilon_t, \quad (11)$$

where $t = 1, 2, 3, \dots$, and a matrix of $(k+1) \times (k+1)$ and $\Pi = I_{k+1} + \Psi_i$ and $\Gamma_i = -\Psi_j$, where $i = 1, 2, 3, \dots, p-1$ includes the long-run multiplier and the short-run dynamic coefficient of error term. Z_t is the coefficient of variables Y_t and X_t respectively. Y_t is an $I(1)$ dependent variable as defined in the respective models and X_t is a matrix of independent variables with $I(0)$ and $I(1)$. X_t also represents the variables with a multivariate identically and independently distributed (i.i.d) zero mean error term coefficient $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})$ and a homoscedastic process. Assuming that there exists a unique long-run relationship between the variables, the conditional ARDL F-bounds co-integration model above will then become:

$$\Delta Y_t = c_{Y0} + \mu t + \delta_{YY} Y_{t-1} + \delta_{XX} X_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta Y_{t-i} - 1 + \sum_{i=0}^{p-1} \xi_i \Delta X_{t-i} + \varepsilon_{Yt} \quad (12)$$

where $t = 1, 2, \dots, T$.

Since the variables analysed were co-integrated the fourth step of the ARDL-based Granger causality tests followed. This test involved the testing of the null hypothesis that there is a robust relationship between banking sector, stock market development and growth by simply running a linear regression equation. The newly developed ARDL provided efficient and robust estimates of all the parameters of a system of equations, with co-integrated variables. In this study all the model parameters in hypothesis 2 were simultaneously estimated and a linear relation between money supply, financial sector credit, value traded, stock market capitalisation, turn-over and bank credit was suggested, where all these variables were dependent on each other after controlling for a deterministic time trend, changes in the respective means of turnover and available bank credit owing to differences in legal and institutional development (Owusu, 2012).

The application of the ARDL test (Pesaran and Shin, 1999) was aimed at approximating the magnitude and robustness of the causal relationships between and among the variables, as outlined in the research hypothesis. The robustness test involved the specification of the following set of ARDL equations derived from the generic model equation (12). Following the empirical views of Shrestha and Chowdhury (2007), Owusu(2012: 181-187) and Magombeyi and Odhiambo (2017: 11-15) the ARDL models to be tested in this study are specified as below :

$$\Delta \ln GDP_t = c_0 + \delta_{1i} \ln GDP_{t-1} + \delta_{2i} \ln BSD_{t-i} + \delta_{3i} \ln SMD_{t-1} + \sum_{i=1}^n \alpha_i \Delta \ln GDP_{t-1} +$$

$$\sum_{i=0}^n \beta_j \Delta \ln \text{BSD}_{t-j} + \sum_{i=0}^m \xi_k \Delta \ln \text{SMD}_{t-k} + \mathcal{E}_t \quad (13a)$$

The error correction equation of equation (13a) then becomes

$$\begin{aligned} \Delta \ln \text{GDP}_t = & c_0 + \sum_{i=1}^n \alpha_i \Delta \ln \text{GDP}_{t-i} + \sum_{i=1}^n \beta_j \Delta \ln \text{BSD}_{t-i} + \sum_{i=1}^m \xi_k \Delta \ln \text{SMD}_{t-i} \\ & + \gamma_1 \text{ECM}_{t-1} + \mathcal{E}_t \end{aligned} \quad (13b)$$

$$\begin{aligned} \Delta \ln \text{BSD}_t = & c_1 + \lambda_{1i} \ln \text{BSD}_{t-1} + \lambda_{2i} \ln \text{GDP}_{t-1} + \lambda_{3i} \ln \text{SMD}_{t-1} + \sum_{i=1}^n \alpha_i \Delta \ln \text{BSD}_{t-1} + \\ & \sum_{i=0}^n \beta_j \Delta \ln \text{GDP}_{t-j} + \sum_{i=0}^m \xi_k \Delta \ln \text{SMD}_{t-k} + \mu_t \end{aligned} \quad (14a)$$

The error correction equation of equation (14a) is

$$\begin{aligned} \Delta \ln \text{BSD}_t = & c_1 + \sum_{i=1}^n \alpha_i \Delta \ln \text{BSD}_{t-1} + \sum_{i=0}^n \beta_j \Delta \ln \text{GDP}_{t-j} + \sum_{i=0}^m \xi_k \Delta \ln \text{SMD}_{t-k} \\ & + \gamma_2 \text{ECM}_{t-1} + \mu_t \end{aligned} \quad (14b)$$

$$\begin{aligned} \Delta \ln \text{SMD}_t = & c_2 + \sigma_{1i} \ln \text{SMD}_{t-1} + \sigma_{2i} \ln \text{BCP}_{t-1} + \sigma_{3i} \ln \text{GDP}_{t-1} + \sum_{i=1}^n \alpha_i \Delta \ln \text{SMD}_{t-1} \\ & + \sum_{i=0}^n \beta_j \Delta \ln \text{BCP}_{t-j} + \sum_{i=0}^m \xi_k \Delta \ln \text{GDP}_{t-k} + \nu_t \end{aligned} \quad (15a)$$

The error correction equation of equation (15a) is

$$\begin{aligned} \Delta \ln \text{SMD}_t = & c_2 + \sum_{i=1}^n \alpha_i \Delta \ln \text{SMD}_{t-1} + \sum_{i=0}^n \beta_j \Delta \ln \text{BCP}_{t-j} + \sum_{i=0}^m \xi_k \Delta \ln \text{GDP}_{t-k} \\ & + \gamma_3 \text{ECM}_{t-1} + \nu_t \end{aligned} \quad (15b)$$

Where α_i , λ_i and δ_i are the long run elasticities corresponding to long run relationship between banking sector development, stock market development and economic growth. According to Poon (2010) the term with the summation signs represent the error correction (ECM) dynamics which is the speed of adjustment back to long run equilibrium after a shock. Coefficients c_0 , c_1 and c_2 are the drifts, μ_t , ν_t , and \mathcal{E}_t are the white noise errors, Δ is the first difference operator, m and n are the lag length for the UECM. \ln is the natural logarithm operator. In order to test the long run relationships for the given models the study thus test the null hypothesis, $H_N : \delta_1 = \delta_2 = \delta_3 = 0$, $H_N : \lambda_1 = \lambda_2 = \lambda_3 = 0$, $H_N : \alpha_1 = \alpha_2 = \alpha_3 = 0$ which indicate no long run relationship against the alternative hypothesis, $H_A : \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$, $H_A : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq 0$, $H_A : \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq 0$. GDP_t is real gross domestic product and SMD_t denotes stock market development indicators, which measures market activity, liquidity and size. Similarly, banking sector development (BSD_t) denotes bank liquidity, financial sector efficiency and thus the extent of information about available investment

opportunities and monitoring provided by banks. The foundation for the model is that there is significant theoretical research on the influence of banking activity on stock market turnover, growth and liquidity (Allen and Gale, 2000; Diamond, 1984; Boyd and Prescott, 1986), which suggests that banking development has a positive impact on stock market activities through its role of risk and information gathering. This implies that prevailing banking sector development (stock market development) affected stock market development and growth (bank sector development and growth) in Zimbabwe from 1988 to 2015.

3.5 CONCLUSION

This chapter discussed the various econometric techniques and the related proxies used in the estimation of the direction of causality and the robustness of the nexus between banking sector, stock market development, and economic growth in Zimbabwe. The chapter went further exposing the weaknesses associated with the several of the econometric models available and providing justification for the choice of the particular methods employed in this study. After meticulous examination of the weaknesses and strengths of other methodologies available for use in finance and growth links, the researcher chose the ARDL and the VEC models because of their unprecedented precision and high level of estimation accuracy when finance–growth relationships are determined. In order to engender a fair and even analogue while ensuring reliability of results for comparisons purposes the causal relationship was tested using an advanced robustness test: the ARDL model as recommended by Ishioro (2013). Corporale et al. (2005) argued that a robustness test circumvents the problems of omitted variables and inefficiency in estimation caused by excess lagged terms associated with causality tests such as the Engle-Granger (1988) and the Gregory and Hansen (1996) tests. The Granger-based ARDL and VEC models were deemed to be the most suitable estimation methods in obtaining unbiased, consistent and efficient estimates of the hypotheses formulated in this study. Empirical results from each of the estimation techniques ranging from unit root tests, co-integration test to Granger causality tests are presented in chapter 4 in the form of preliminary data analysis and interpretation of results.

CHAPTER 4: PRELIMINARY DATA ANALYSIS

4.1 INTRODUCTION

In the previous chapter the research design and associated estimation models used in investigating the nexus between banking sector, stock market development and economic growth were discussed. This chapter describes the preliminary data analysis conducted for the trajectories followed by the financial development and economic growth variables over the years in Zimbabwe. Three pre-estimation diagnostic analytical techniques were conducted in this study namely: i) trend analysis, ii) descriptive statistical analysis and iii) correlation analysis. These analyses were carried out in order to present a snapshot or preview of empirical estimation results at a glance. The remainder of the chapter provides a discussion of the pre-estimation diagnostics under four sub-sections. The first section presents a discussion of trends in the Zimbabwean financial sector with reference to graphical representations of stock market, banking sector and related economic developmental trends, proxies, instruments and dynamics. The second section presents a discussion of the descriptive analysis of statistical measures of central tendency. The third section discusses the correlation analysis and its results. The fourth and final section of the chapter comprises the conclusion.

4.2 TREND ANALYSIS

This section involved the use of line graphs (trends) as diagrammatical representations of a dataset. These were intended to provide a more detailed and informative analysis of the finance-growth nexus in Zimbabwe. The key elements of the data set quantified in the line graph highlighted a link between the purely descriptive and the numerical data approaches to analysing data (Stead, 2007). As such trends in the Zimbabwean financial sector were analysed and discussed under three headings: i) banking sector trends, ii) stock market trends and ii) economic growth trends.

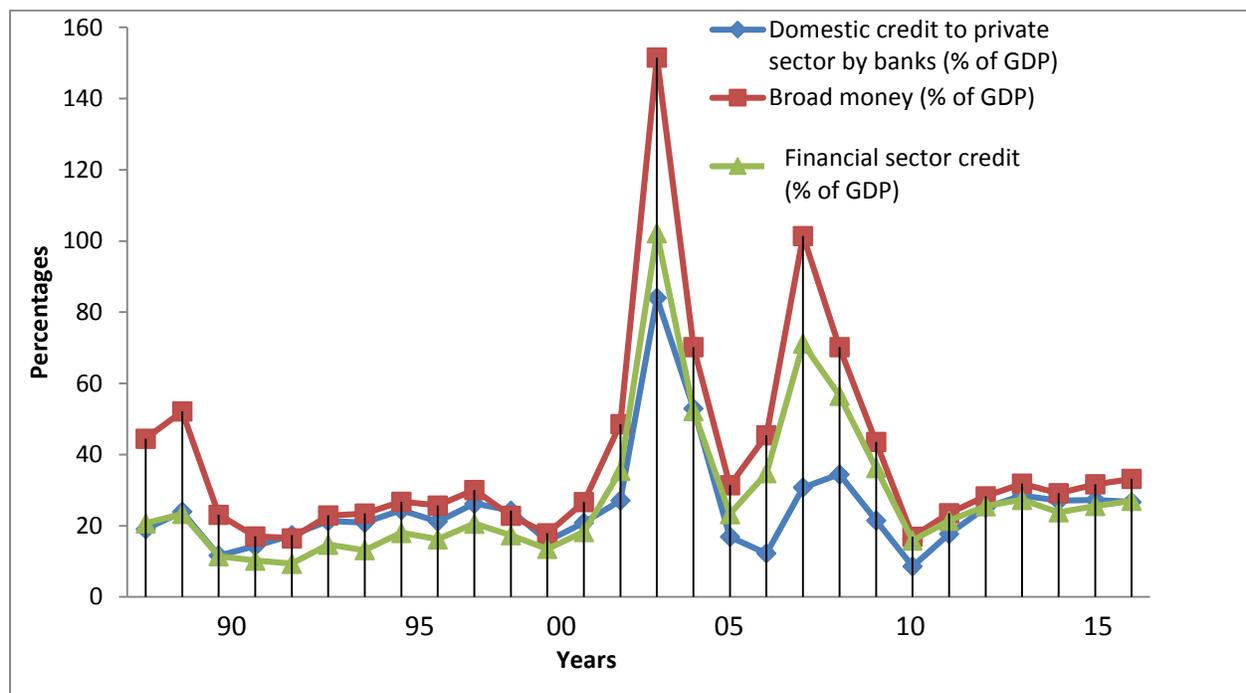
4.2.1 Banking sector trends in Zimbabwe

Relative to the region, Zimbabwe has historically had a comparatively banking sector with fairly advanced products (mortgages, vehicle and asset finance, treasury bills and bond issues). Kadenge and Tafirei (2014:76) asserted that, at independence in 1980, Zimbabwe had a very sophisticated banking and financial market, with commercial banks mostly foreign owned and a central bank inherited from the Central Bank of Rhodesia and Nyasaland at the winding up of the Federation. For the first few years of independence, the government did not interfere with the banking industry.

However, after 1987 at the behest of multilateral lenders, the government embarked on an Economic and Structural Adjustment Programme (ESAP), which brought major changes to the operations of most sectors of the economy, the banking sector included.

The sector is poised for growth with improved capacity to support the economy arising from policy initiatives being transformed by 18 banking institutions operating under the supervision of the Reserve Bank of Zimbabwe (RBZ, 2016). Zimbabwe Central Statistics (ZIMSTATS, 2016) stipulated that these banking institutions comprise thirteen (13) commercial banks, three (3) building societies, one (1) merchant bank, one (1) savings bank and 147 microfinance institutions. Over the 1988-2016 period banking sector development indicators (banking credit to private sector (BCP), financial sector credit (FSC) and broad money (M3) all expressed as ratios of GDP) showed more or less similar co-performances. This is demonstrated in the Figure 6 below which reveals trends in Zimbabwean banking sector development over time (1988-2015).

Figure 6: Banking sector trends in Zimbabwe.



Source: Author's compilation using information from World Bank (2015)

A critical analysis of the trends in Zimbabwean banking sector development over the period 1988 to 2015 can be dealt with in three periods, namely: i) a pre-banking crisis period from 1988 to 2002, ii) a banking crisis period from 2003 to 2008, iii) a post banking crisis period from 2009 to 2015. The pre-banking crisis period from 1988 to 2002 recorded some positive steady development

and growth in the banking sector in Zimbabwe as indicated above in Figure 6. As illustrated in the graph as from 1991 all three indicators of banking development in Zimbabwe (domestic credit to private sector, financial sector credit and M3) began recording positive marginal changes in their trends. This was demonstrated by financial reforms undertaken in 1991 which led to significant changes in the structure of the banking sector in Zimbabwe (RBZ, 1996).

Following the enactment of financial reforms the financial services sector began to accommodate broader local participation (RBZ, 1999). Deregulation of the financial market engendered local ownership of banking institutions, from a situation where there were no indigenous banks at independence (1980), to a 71 % mark local ownership by December 2002. According to RBZ (2002) this liberalisation led to increased competition, improved efficiency and the de-segmentation of the financial sector. In response to the liberalisation of the Zimbabwean economy the total deposits held by indigenous banks rose to about US\$3 billion (70%) while foreign owned institutions held US\$1.3billion (30%) of total deposit by the end of 2002. This was indicated by a sharp increase of 150% in domestic credit to the private sector between 2000 and 2002 followed by a significant shift in loan allocation among sectors. The IMF (2003) added that this increased competition came with the introduction of new products and services such as e-banking and in-store banking. These entrepreneurial activities resulted in the deepening and sophistication of the financial services sector.

In the period 2003 up to 2008 the Zimbabwe banking sector was in a crisis. This crisis period saw the banking sector development indicators burgeoning against a backdrop of falling GDP levels - to an unprecedented average of -6.5% annually (World Bank, 2015). The RBZ (2010) noted that during the same period the Zimbabwean economy was in a crisis largely caused by the hyperinflationary situation, global liquidity crunch and low domestic saving, volatile deposits and unsound banking practices. This instability in the economy intensified the banking crisis of 2003-2008 which saw thirteen locally owned banks facing closure in order to protect depositors. Despite numerous hurdles that have sought to impede growth in the sector, among them, dented confidence impending from the promulgation of the economic empowerment regulations and unsustainable debt overhang above US\$10 billion. This undermined the banking sector's ability to attract offshore lines of credit causing the economy to remain unyielding (IMF, 2008).

Following the introduction of the multi-currency system in 2009 the financial sector stabilised and significant development were witnessed in the economy as a whole in the post-crisis period (2009-2015). Notwithstanding the turmoil that has haunted the sector since the inception of the Zimbabwe multi-currency regime, fortunes seem to have taken a positive turn in one of the oldest financial systems in Africa (RBZ, 2009). Having survived a decade of an astronomically hyperinflationary climate, with unemployment above 95%, negative economic growth and industry capacity utilisation below 20%, Zimbabwe's banking sector is on the mend with 13 of its 16 commercial banks recording profits in the half year period to 30 June 2012 (World Bank, 2012).

The financial services sector has been the fastest growing sector in the economy with an average growth rate of 13% since 2009 and a growth projection of 23% to financial year ending 2012 (IMF, 2013). Similarly the RBZ (2015) argues that since the dawn of this multicurrency dispensation the banking sector in Zimbabwe has demonstrated resilience against major shocks and has contributed significantly to the economic transformation of the real economy. The banking sector has promoted an economic growth rate averaging 7.5% largely owing to restored confidence in the banking sector, sound banking practices and improved financial discipline (RBZ, 2016).

As shown in Figure 6 above, from 2009 to 2015 total banking sector deposits (as measured by FSC as a ratio of GDP) continued on an upward trajectory, increasing by 14.2% from \$4.9 billion at end of 2014 to \$5.6 billion as at end of 2015. By end of 2015, domestic credit to private the sector by banks amounted to \$4.0 billion, translating into a loan to deposit ratio of 71.4 %. Bank deposits were largely dominated by demand deposits, which accounted for 55.49% of total deposits. These demand deposits were relatively short-term in nature, with constraining effects on banking institutions' ability to meet the long-term funding requirements of key productive sectors (RBZ, 2016).

According to the World bank (2015) total banking sector loans and advances increased marginally from \$3.8 billion as at end 2014 to \$4.0 billion as at end 2015. Broad money supply in the market (as measured by M3 as a ratio of GDP) averaged \$483 million between January and December 2015, compared to \$338 million over the same period in 2014. This trend was largely underpinned by a slowdown in lending by banks and an increase in deposits. RBZ (2016) documented that the banking sector remained profitable with an aggregate net profit of \$43.01 million for the half year

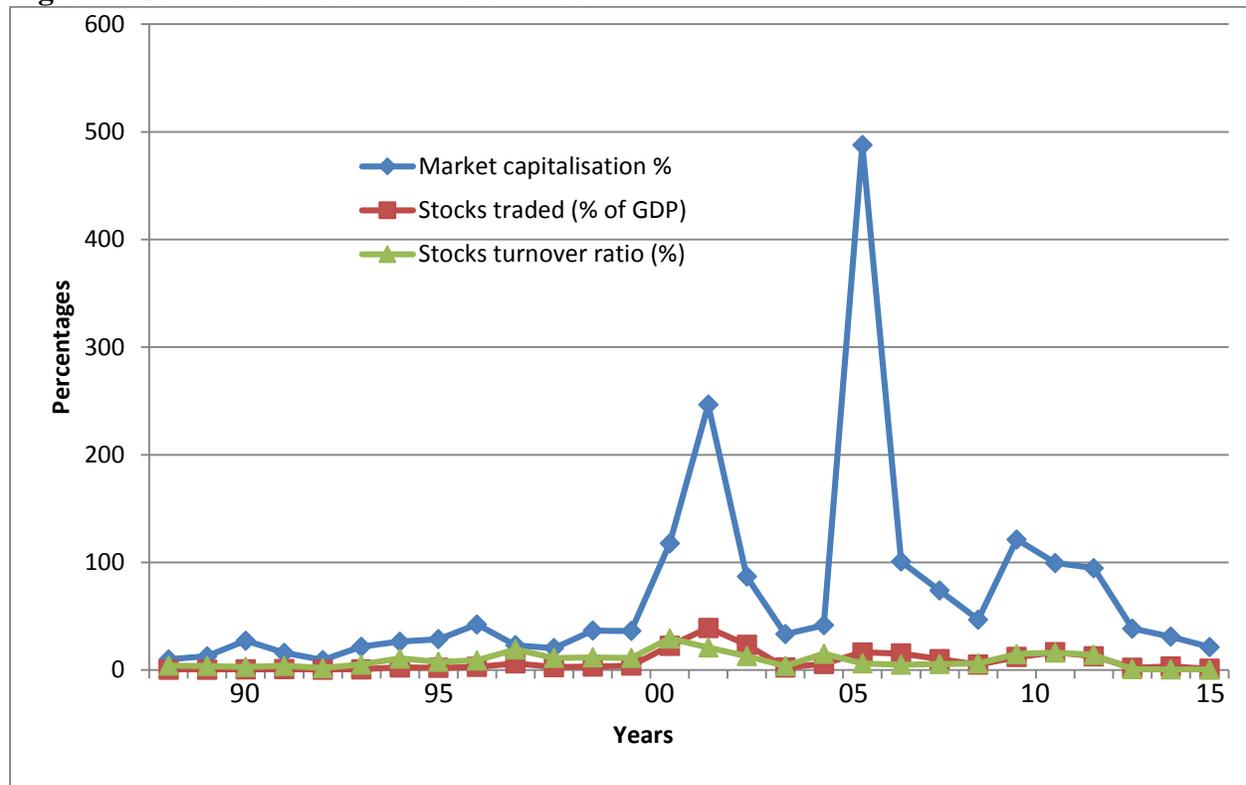
ending 30 June 2015, which was an increase from \$26.53 million during the corresponding period in 2014. This positive earnings curve bolstered the banking sector's aggregate core capital base, leading to a significant increase of 19% from \$753.3 million in 2014 to \$899.10 million in 2015.

4.2.2 Stock market trends in Zimbabwe

The Zimbabwe Stock Exchange like others globally, was established in 1894 in Harare. The stock market was instituted in order to mobilise long-term savings to finance investments, provide equity to entrepreneurs, encourage broader ownership of firms and production outfits (such as the gold-mining industry) and improve the intermediation process through competitive pricing mechanisms (Allen et al., 2012). Trends in the Zimbabwe stock exchange (ZSE) can be analysed in three different phases, namely: i) a steady growth phase from 1988 to 1998; ii) a high volatility phase from 1999 to 2008; and iii) a sustained decline phase from 2009 to 2015. In the steady growth phase the Zimbabwe stock exchange experienced a steady positive growth from 1988 to 1998. The ZSE was opened to foreign players in mid-1993 following the partial lifting of exchange control regulations (RBZ, 1990). Foreign participation on the exchange increased trading activity, turn over, value traded, market capitalisation and integration with world financial markets. As a result annual stock market turn-over increased significantly from US\$53 million in 1990 to US\$150million in 1995 an increase of 184.61% (World Bank, 1996).

Following the liberation of the financial market in Zimbabwe, the number of newly listed counters went up from 57 listed companies at the end of 1990 to 64 by the end of 1996. During this same period market capitalisation followed suit with a sharp increase noted from US\$2.4billion in 1990 to US\$3.64 billion by the end of 1996. This is shown in the Figure 7 below, which illustrates the trends of stock market development in Zimbabwe for the period 1988 to 2015.

Figure 7: Stock market trends in Zimbabwe



Source: Author’s compilation using information from World Bank (2015)

Figure 7 above shows that market capitalisation as a percentage of GDP went up by 240% between 1989 and 1996. This increase came as a result of the liberalisation of exchange control restrictions on foreign investment. The rise in trading activities on the ZSE led to a rise in annual turnover from US\$39 million in 1989 to US\$245million in 1996. Although the values of shares traded and turn over declined significantly by 88% and 60% respectively in the high volatility phase (1999 to 2008), market capitalisation continued to improve reaching levels of US\$2.4 million in 1999. In early 2000 the value of shares traded more than doubled to an amount of US\$26.5 billion making the ZSE to be ranked sixth among the 33 emerging stock markets in the world (ZIMSTATS, 1999). As illustrated in Figure 7 market capitalisation increased by 119.3%, from US\$2.4million at the beginning 2000 to US\$5.3million in 2008. The high market capitalisation experienced by the ZSE up to 2008 reflects speculative tendencies, since the phenomenon was not matched by positive responses in economic growth and trading activities (RBZ, 2009). Speculative activities on the ZSE were also exacerbated by other factors such as poor economic growth, rapid de-industrialisation and inconsistent policy issues. This resulted in the suspension of trade on the ZSE in late 2008. The ZSE later resumed operating in early 2009 following the dollarisation of the economy.

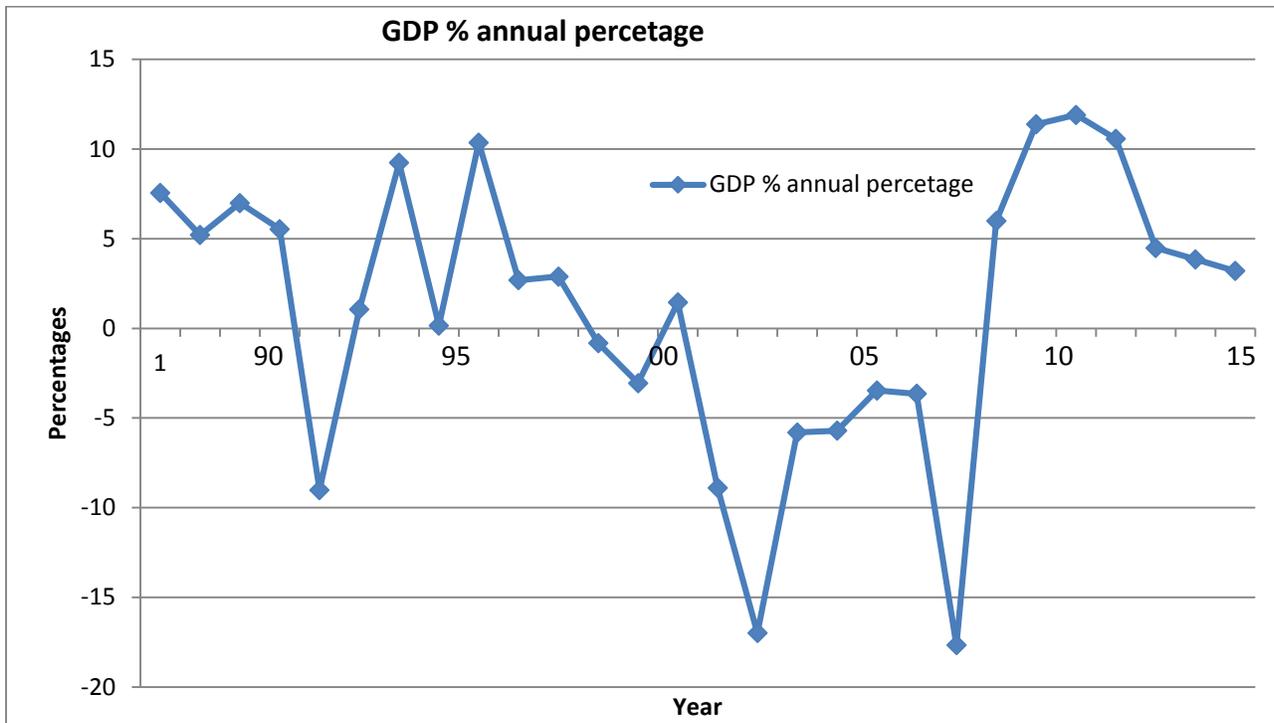
The post-2010 period saw a series of unimpressive performances on the ZSE reflected in the downward trends of market capitalisation, stock market turn-over and value traded ratios indicated in Figure 7 above. In the sustained decline phase from 2009 to 2015 the ZSE recorded a series of significant declines in trading. The number of listed counters dropped from 81 in 2010 to 64 in 2015 a 21% decrease. During the same period, stock market capitalisation decreased sharply by 73% from US\$11476 million in 2010 to US\$3073 million in 2015. While at the same time value traded went down to US\$183million from an amount of US\$1 144million in 2010 a percentage decrease of 83%. It was noted also that a significant decrease of 39% in stock turnover occurred on the ZSE from US\$572million in 2010 to US\$350million in 2015.

According to the ZSE (2015) report the continued losses recorded in heavily capitalised counters resulted in the ZSE market capitalisation declining to a low level of US\$3 073.4 million by the end of 2015, while the industrial index lost 2.3%, falling from 117.6 points to 114.9 points. The losses in the industrial index were further exacerbated by global market crises caused by a slowdown in Chinese economic productivity in 2015. During the same period, global markets also recorded losses, despite the Federal Reserve Bank's interest rate hike of 0.25. African markets followed suit by recording losses: however, this was partly due to concerns over an acceleration of capital outflows, as global investors shifted their portfolio investments to the US market (ZSE, 2016).

4.2.3 Economic growth trends in Zimbabwe

The trends in economic growth in Zimbabwe can be subdivided into three periods, namely: i) a positive economic growth period from 1988 to 1998; ii) a negative economic growth period from 1999 to 2008; iii) a period of economic recovery from 2009 to 2015. While Zimbabwe experienced weak yet positive growth rates averaging 3.9% annually for the period 1988 to 1998, growth rates trends in this phase were largely affected by macroeconomic challenges, including among others drought in 1992 and low investment and industrial productivity as a result of foreign currency shortages (RBZ, 2001). Figure 8 below shows the real annual GDP growth rate for Zimbabwe from 1988-2015.

Figure 8: Zimbabwe Annual Real GDP Growth rate 1988-2015.



Source: Author’s compilation using data from World Bank (2015)

As shown in Figure 8 above, Zimbabwe experienced positive and negative growth trajectories averaging 0.32% annually over the period 1988-2015. Even though the period from 1985 to 1990 was characterised by positive growth, the period from 1990 to 1995 was mainly composed of falling GDP levels, from US\$8.7 billion to US\$7.1 billion. This shrinking of the economy continued in the period 1995 to 1999, which saw a further drop in GDP of 7.1% and in the same period per capita GDP went down by even greater margins to 13.22%.

The period from 1999 to 2008 not only recorded a decline in economic growth but the downturns went to extremes of negative marks. During this period, GDP declined from US\$6.6 billion in 2000 to US\$5.6 billion in 2005 at the same time per capita GDP dropped from US\$528 to US\$444. The economy of Zimbabwe was thus characterised by a sustained decrease in real GDP averaging -6.5% per year dropping sharply to low levels of -17.67% in 2008 during periods of insurmountable levels of hyperinflation. Within this period Zimbabwe experienced four major droughts, the banking crisis of 2003-2004 and the unprecedented levels of inflation reaching a peak of 231million% in mid-2008 (Zimstats 2012; Tsurai and Odhiambo, 2012).

Nonetheless, since dollarisation in 2009, the Zimbabwean economy has maintained a steady sustainable positive growth in GDP with growth averaging 11.0% between 2009 and 2012. Only until recently has economic growth slowed to around 3% levels in 2014, with only a marginal improvement of 3.2% experienced in 2015, as a result of persistent de-industrialisation and a growing informal economy. Against the background of weak domestic demand, tight liquidity conditions and the appreciation of the US dollar against the South African rand, inflation was slightly negative in 2014, and it remained at low levels in 2015. Industrial capacity utilisation continued to decline, and was estimated at 36.3% owing to underproduction and a lack of competitiveness. The overvaluation of the real exchange rate relative to the South African rand has caused a loss in external competitiveness, as it made imports cheaper than domestically produced goods (RBZ, 2016). Exports became more expensive on the international market making them unattractive to these foreign markets. As a result of an increasing demand for imports and dwindling exports, the external sector position was put under severe pressure, with an estimated current account deficit of around 23.1% in 2014.

The economic recovery in recent years has been underpinned by the mining and agriculture sectors, which accounted for 93.5% of export revenues between 2009 and 2013. Mining, making up 65.2% of export earnings over the same period, is a typical enclave sector with weak linkages to the rest of the economy. It is also capital intensive, with limited employment creation opportunities. The manufacturing sector saw a drop in activity between 2011 and 2014: at least 4 610 companies closed down, resulting in a loss of 55 443 jobs (ZIMSTATS, 2015). The end of the year 2012 was marked by an economic rebound, with the GDP growing at an average rate of 11.0% per annum. However, GDP growth decelerated sharply from 10.6% in 2012 to 4.5% in 2013 and an estimated 3.1% in 2014. Real GDP was projected to marginally improve to 3.2% in 2015. This projected marginal improvement would be on the back of planned investments in agriculture, mining, communications and other infrastructure projects, including the water and energy sector.

To sum up the afore illustrated diagrammatical representations and accompanying analysis of annual growth in GDP and financial variables over time, although useful at presenting an overview of trends in data set, only provide a little detailed numerical information. According to Stead (2007) financial development trends and diagrams rely on the available visual presentation of macroeconomic data. For decision-making purposes and informed descriptions, descriptive

statistical analyses are often much more useful in providing informative, exhaustive yet detailed analyses of finance-growth datasets as illustrated in the following section.

4.3 DESCRIPTIVE STATISTICAL ANALYSIS

In this section a breakdown of statistical analysis is presented in order to validate and justify the normality of data used in econometric modelling. As such statistical analysis was used to reasonably describe the main features of the dataset by making reference to measures of central tendency which include the mean, standard deviation, median, range, skewness and kurtosis. Unlike trends descriptive statistics allow the researcher to form reliable descriptions while building upon a detailed and reasonable pictorial representation of finance- growth variables in Zimbabwe from 1988 to 2015. Table 1 below presents summarised statistics of variables employed in econometric analysis. The statistics are provided for each variable and were calculated over 28 periods (1998-2015).

As indicated in Table 1 that follows annual growth in GDP for Zimbabwe ranges on average between very low levels, to the extent of negative averages (-17.69%) to high levels exceeding 10% growth. Variability from the mean for Zimbabwe GDP is within acceptable limits, as explained by a standard deviation of 7.87. Moreover, the distribution of annual growth rate in GDP over time although negatively skewed, is unlike the rest of the financial development variables. It passed normality tests in this study and conformed meticulously to standard features of normal distribution of data. This is evidenced by a 3.05 kurtosis level, which is very close to the standard ($k=3$) describing normal distribution of data overtime (Stead, 2007).

The Table 1 below reports means and standard deviations for financial development and growth in Zimbabwe. Market capitalisation (MCAP) shows high variability from the mean, with a high standard deviation of 96.18 as opposed to 6.96 and 9.23 for stock market turnover (TR) and value traded (VT) respectively. This implies that growth in the Zimbabwe stock market was not supported by trading activity (market liquidity) over the years in question (ZSE, 2013). Apparently market capitalisation had more extreme high values (outliers) with a maximum value of 487.8% than the measures of liquidity with maximum values of 29.4% and 39.18% for stock turnover and value traded respectively.

Table 1: Descriptive statistics

	Variables						
	GDP	BCP	FSC	M3	MCAP	TR	VT
Mean	1.05	25.09	28.05	39.52	69.78	9.18	7.74
Median	2.78	22.76	22.36	29.62	36.51	6.97	3.36
Maximum	11.91	84.05	102.18	151.55	487.82	29.40	39.18
Minimum	-17.67	8.59	9.34	16.55	9.3	0.53	0.30
Std. Dev	7.87	14.3	20.45	29.19	96.18	6.96	9.23
Skewness	-0.77	2.77	2.17	2.47	3.27	0.98	1.76
Kurtosis	3.05	11.82	7.72	9.29	14.19	3.71	5.96
Jarque-Bera	2.74	126.56	47.94	74.55	196.14	5.08	24.72
Probability	0.25	0.00	0.00	0.00	0.00	0.08	0.00
Sum	702.5441	29.36251	785.4322	1106.487	1953.836	256.9776	216.7346

Source: Author's compilation using data from World Bank (2015). Where GDP is Gross domestic product, BCP is Banking credit to private sector, FSC is Financial sector credit, M3 is broad money supply, MCAP is market capitalisation, TR is Turn-over ratio and VT is the value of shares traded.

Notwithstanding these disparities, all the stock market development variables seem to give rise to positively skewed distributions. This is validated by the different skewness coefficients amongst the variables, 3.27 for market capitalisation, 0.98 for turnover ratio and 1.76 for value traded. Stead (2007) observes that kurtosis (K) coefficient indicates that a leptokurtic (very peaked) distribution exists. As illustrated in the above table kurtosis for market capitalisation and value traded since k were 14.19 and 5.96 respectively, while a mesokurtic distribution can be confirmed for stock market turnover ratio with kurtosis coefficient (K) of 3.71. Stead (2007) adds that a mesokurtic distribution is a distribution which is similar to the standard normal distribution with a kurtosis coefficient (K) of 3, therefore since a coefficient of 3.17 is very close to the standard ($k=3$), the stock market turnover distribution can safely be termed a mirror image of the standard normal distribution.

On the other hand, banking sector development indicators (banking credit to private sector (BCP), financial sector credit (FSC), broad money supply (M3)) were considered in order to measure the overall size of the banking sector. Statistical values obtained for each of the indicators showed a perfect lockstep trajectory in the co-movements of these statistics. The means for all three variables ranged from 25.4 to 39.52 while standard deviation ranged from 14.3 to 29.19, thus moving in the

same direction, unlike the divergence in co-movements noticed in the case of stock market development variables. All three indicators confirmed positively skewed distributions with coefficients of 2.77 for banking credit to private sector, 2.17 for financial sector credit (FSC) and 2.47 for broad money (M3). Thus a leptokurtic (very peaked) distribution could be confirmed for banking credit to private sector with a coefficient of kurtosis (k) of 11.82; financial sector credit (FSC) had a k value of 7.72 while broad money (M3) had a k value of 9.29.

Since the Jarque-Bera criteria confirmed non-normality of data for all the financial development indicators (both stock market and banking sector indicators) at a level of 5% significance, these variables were then transformed to natural logarithm form according to Beck's (2011) argument. Beck (2011) stipulated that for a time series data set to be used in econometric analysis and the estimation of relationships between variables, it must conform to features of normal distribution (in other words data series must pass normality tests). If the dataset displays non-normality features it must be converted into natural logarithms so that it will be fit for econometric analysis. Odhiambo (2008) made much the same argument and further posited that normality of a dataset is a pre-requisite in econometric modelling if it is to be suitably applied in model estimation. For this reason, all the data variables in this study were converted to natural logarithm format, after which they passed normality tests at 1% level of significance. This made the data set fit for econometric analysis in examining the direction of causality between banking sector, stock market and economic growth in Zimbabwe.

Although descriptive statistics provided a reliable and informative analysis of finance-growth datasets in this study, most theorists have argued that descriptive statistics are subjective in nature and sometimes result in mixed while conflicting conclusions. These statistics may inform or mislead in decision-making therefore it is important to evaluate the extent to which a statistic is useful in explaining financial development and growth datasets (Stead, 2007). For instance the mean of a financial development variable (say market capitalisation) is affected by market capitalisation outliers (extremely high values), hence it may fail to be a typical representative of the data set. The range in the Zimbabwe finance-growth dataset only used two numbers (maximum and minimum) and provided no indication of all values in that data-set. Furthermore, Zimbabwean descriptive macro-economic statistics did not tell the researcher anything about the relationship between finance- growth variables; for this reason the researcher conducted correlations analysis

in order to determine how associated the variables were. The next section addresses the illustrated short-falls by presenting an analysis of correlation results between finance and growth variables in Zimbabwe.

4.4 CORRELATION ANALYSIS

Correlation analysis mitigates the problems of multi-collinearity and endogeneity (when independent variables themselves affect each other) associated with a number of econometric models. For this reason, this study conducted correlation analysis in order to critically examine the magnitude, strength and nature of co-movements between and amongst finance and growth variables in Zimbabwe. Correlation coefficients can take any value from +1 to -1 with the sign of the coefficient indicating the direction of the relationship between the two finance-growth variables. A positive coefficient implies that the variables move in same direction while a negative one indicates movement of variables in opposite directions (Stead, 2007). The Table 2 below presents the empirical correlations matrix between growth, stock market and banking development indicators in Zimbabwe (1988-2015).

Table 2: Correlation Matrix

Variables	BCP	GDP	FSC	M3	MCAP	TR	VT
BCP	1.0000						
GDP	-0.3903 (0.040)	1.0000					
FSC	0.8457 (0.000)	-0.4824 (0.0092)	1.000				
M3	0.8482 (0.000)	-0.4474 (0.017)	0.9739 (0.000)	1.0000			
MCAP	0.4612 (0.0013)	-0.2009 (0.305)	0.7551 (0.000)	0.7245 (0.000)	1.0000		
TR	0.3585 (0.061)	-0.0064 (0.974)	0.3214 (0.095)	0.2896 (0.135)	0.2485 (0.202)	1.0000	
VT	0.8173 (0.000)	-0.3444 (0.073)	0.8586 (0.000)	0.8011 (0.000)	0.6458 (0.000)	0.6559 (0.00)	1.0000

Sources Author's compilation using data from World Bank (2015). Where GDP is Gross domestic product, BCP is Banking credit to private sector, FSC is Financial sector credit, M3 is broad money supply, MCAP is market capitalisation, TR is Turn-over ratio and VT is the value of shares traded. Figures in brackets represent probabilities.

As shown in table 2 above, GDP correlated significantly and negatively with most of the financial development variables in Zimbabwe. This is clear from the negative correlation coefficient between the finance-growth variables. However there seemed to be no correlation between GDP

and stock market turnover in Zimbabwe, since the correlation coefficient was 0.0064 (almost zero). These correlation results also show that there was a positive correlation between banking sector development and stock market development indicators. This can be explained by the positive coefficients found in co-movements between market capitalisation (MCAP), banking credit to private sector (BCP), financial sector credit (FSC) and broad money supply (M3) respectively.

As indicated above, the correlation between MCAP and BCP was 0.46, between MCAP and FSC was 0.76 while between MCAP and M3 it was 0.72. Stock market turn-over ratio (TR) produced a correlation coefficient of 0.36, 0.32 and 0.29 between BCP, FSC and M3 respectively, whereas correlation coefficient between value traded and BCP, FSC and M3 were 0.82, 0.86 and 0.80 respectively. These results therefore validates the findings of Dermiguc-Kunt and Levine (1999) and of Levine and Zervos (1998) who postulated that measures of stock market development were positively correlated with banking sector development measures. Since most of the correlation coefficients were at most 85% it can be confirmed that no multi-collinearity existed between or amongst the growth, stock market and banking development variables (Stead, 2007).

4.5 CONCLUSION

This chapter presented the results of a preliminary analysis using three different pre-estimation diagnostic analytical techniques, namely trend analysis, descriptive (statistical) analysis and correlation analysis. These techniques provide a preview of the nature, magnitude and robustness of the expected empirical results of the study. Diagrammatical and statistical representations were provided in order to offer a snapshot of econometric results in a more structured yet quantified manner. The following chapter focuses on the analysis of the actual empirical results obtained from running the econometric models used in the study. Empirical results from each of the estimation techniques ranging from unit root tests, co-integration test to Granger causality tests are discussed.

CHAPTER 5: DATA ANALYSIS AND DISCUSSION OF RESULTS

5.1 INTRODUCTION

This chapter presents econometric results and findings of the estimations carried out using the models outlined in the previous chapter. The study employed the vector error correction model (VECM) and the autoregressive distributed lag (ARDL) approach to estimate long and short-run relationships between banking sector, stock market development and economic growth. This rest chapter is structured as follows: section 5.2 focuses on the analysis of unit root results. Section 5.3 provides the co-integration results obtained from both the maximum likelihood procedure of Johansen (1988) and the Bounds testing approach of Pesaran and Shin (1999). This is followed by section 5.4, which focuses on the results from the vector error correction model (VECM). Section 5.5 discusses robustness and diagnostic test results while the last section 5.6 concludes the study.

5.2 UNIT ROOT TESTS

In order to test for robustness of results three unit root tests were carried out: Augmented Dickey-Fuller (ADF), Detrended Dickey-Fuller (DF-GLS) and Phillip–Peron (PP). Table 3 below provides the results of unit root tests in levels and at intercept. The results in Table 3 below shows that most of the series were integrated of order 1(0). This means that the series were not stationary at level thus a need arose for stationarity tests to be conducted at first difference. Running unit root test at first difference resulted in all the series becoming integrated of order 1(1). This was a confirmation of stationarity of all series to be used in modelling relationships. According to Tsauroi and Odhiamho (2012), if the test statistic computed is less than the critical values, the null hypothesis is rejected and a conclusion is drawn that the series are stationary. Since the computed test statistic was greater than the critical values in most of the series (see Table 3) non-stationarity could be confirmed in level form.

The ADF unit roots tests indicated that the GDP and VT series were non-stationary at all levels of significance (that is 1%, 5%, 10%) in level form except M3, FSC and TR which merely became stationary at the level of significance of 10%. A critical examination of the DF-GLS unit root tests showed that only GDP and VT were non-stationary in level form at all levels of significance; the remaining variables (MCAP, BCP, TR, FSC and M3) were stationary in level form. The results of the PP unit root test revealed that GDP was non stationary in level form while M3, FSC and TR only became stationary at the 10% level of significance.

Table 3: Unit root tests in Levels (Intercept)

Variables	Augmented-Dickey-Fuller (ADF)		Detrended Dickey-Fuller (DF-GLS)		Phillip –Peron (PP).	
	T- statistic	Critical value	T- statistic	Critical value	T- statistic	Critical value
GDP	-3.137	-3.69 -2.97** -2.63*	0.013	-2.653 -1.953 -1.609	-0.0722	-3.699 -2.976 -2.627
BCP	-4.099	-3.711*** -2.981** -2.629*	-4.117	-2.656*** -1.954** 1.609*	-3.142	-3.699 -2.976** -2.627*
FSC	-2.842	-3.699 -2.976 -2.6274*	-2.867	-2.653*** -1.954** -1.609*	-2.729	-3.699 -2.976 --2.627*
M3	-3.155	-3.699 -2.976** -2.627*	-3.213	-2.623*** -1.953** -1.610*	-3.037	-3.699 -2.976** -2.627*
MCAP	-4.252	-3.699*** -2.976** -2.627*	-4.145	-2.653*** -1.953** -1.610*	-4.250	-3.699*** -2.976** -2.627*
TR	-2.746	-3.699 -2.976 2.627*	-2.657	-2.653*** -1.954** -1.610*	-2.746	-3.699 -2.976 -2.627*
VT	-1.634	-3.724 -2.986 -2.632	-1.469	-2.661 -1.955 -1.609	-2.279	-3.699 -2.976 -2.627

(Notes: * ** *** refers to the rejection of null hypothesis at 10%, 5% and 1 % significance levels respectively)

In order to achieve efficiency and a high level of accuracy in modelling Odhiambo (2008) observes that all variables employed in statistical models should be stationary at the 1% level of

significance. On these grounds all the variables were tested further for unit roots at first difference as illustrated in Table 4 which shows unit root testing results at first difference.

Table 4: Unit root tests at 1st difference (intercept)

Variables	Augmented-Dickey-Fuller (ADF)		Detrended Dickey- Fuller (DF-GLS)		Phillip –Peron (PP).	
	t-Statistic	Critical Value	T- statistic	Critical value	T-statistic	Critical value
lnGDP	-3.940	-3.711 *** -2.981 ** -2.629*	-4.003	-2.656*** -1.954** -1.609*	-3.932	-3.711*** -2.981 ** -2.629*
LnBCP	-5.4218	-3.737*** -2.991 ** 2.635*	-5.426	-2.664*** -1.955** -1.608*	-10.544	-3.711*** -2.981 ** -2.630*
LnFSC	-5.361	-3.737*** -2.991 ** -2.635*	-5.474	-2.665*** -1.955** -1.609*	-9.794	-3.712*** -2.981 ** -2.629*
LnM3	-5.380	-3.737*** -2.991 ** -2.635*	-5.411	-2.665*** -1.956** -1.609*	-10.955	-3.711*** -2.981 ** -2.629*
LnMCAP	-6.455	-3.737*** -2.991 ** -2.635*	-6.614	-2.664*** -1.956** -1.609*	-14.281	-3.711*** -2.981 ** -2.629*
LnTR	-6.054	-3.711* -2.981 ** -2.629***	-6.179	-2.657* -1.954*** -1.609***	-6.692	-3.711* -2.981 ** -2.629***
LnVT	-7.037	-3.724*** -2.986** -2.632*	-7.187	-2.661*** -1.955** -1.61*	-4.952	-3.711*** -2.981 ** -2.629*

Notes *** ** refers to the rejection of null hypothesis at 10%, 5% and 1 % significance levels respectively

Table 4 indicates that stationarity of all the series can be confirmed since the computed test statistics are less than the critical values at all levels of significance. Across the three unit root test models the null hypothesis of non-stationarity was therefore rejected and the conclusion reached was that all the series had a unit root at first difference.

5.3 CO-INTEGRATION TESTS

Since it had been established that the variables under examination were integrated of order 1(1) co-integration tests were then performed to determine whether a long-run relationship existed among the series in use (Tsaurai, 2015). In order to obtain robust results the study employed a combination of both the maximum eigenvalue test and trace test statistics. Furthermore, in this study a combination of three stock market development proxies (MCAP, VT, TR) and three banking sector development proxies (BCP, FSC, M3) was used, which resulted in nine models with varied variables being applied interchangeably. Al-Fayoumi (2009) observed that Johansen's co-integration analysis is very sensitive to the choice of lag length: for this reason it was important that the optimum number of lags must be precisely determined. Akaike (1973) notes that a lag length is determined by applying a combination of tests ranging from the Akaike Information Criterion (AIC), the Final Prediction Error (FPE) to the Likelihood Ratio (LR) test. In this study all these procedures suggested the use of VAR lag 2 for Model A, D, E, F and lag length 1 for model B, C, G, H, I as shown in Table 5 below.

A meticulous analysis of the co-integration model A, B, C, D, E, F, G, H and I revealed that the model results permitted a linear deterministic trend in data series and intercepts. The results for trace tests in model A indicate that the null hypothesis of $r \leq 1$ was rejected against the alternative that $r \geq 2$ at the 5% level of significance. This suggests the presence of three co-integrating vectors in that model. For the same model A, the maximum eigen-value statistics rejected the null of $r = 0$ against the alternative of $r \geq 1$ at 5% significance level providing some evidence of the presence of one co-integrating vector. Results for model C and H revealed that, for both trace and maximum eigenvalue test statistics the null hypothesis of $r = 0$ was rejected against an alternative of $r \geq 1$ at 5% significance level. This provides evidence for the existence of one co-integrating vector at the 5% significance level. Since the trace statistic and eigen-values were both greater than critical values over the given range of vectors at the 5% level of significance, a conclusion could be drawn that three co-integrating vectors existed in Model D. No evidence of co-integration in model B, E, F, G or I was found and based on this they were dropped from the study. Despite this, the co-integration results revealed that time series data from 1988 to 2015 apparently supported the hypothesised existence of a stable long-run relationship in Zimbabwe among the variables in models A, C, D and H.

Table 5: Johansen Jeselius Maximum Likelihood co integration Test results

	H0	H1	Trace statistic(Critical v.)	Maximum Eigen (Critical v.)
ModelA [GDP=f(BCP,MCAP)]	r=0	$r \geq 1$	42.512* (29.797)	26.617* (21.131)
	$r \leq 1$	$r \geq 2$	15.894* (15.494)	7.189 (14.264)
	$r \leq 2$	$r \geq 3$	0.893 (3.841)	0.893 (3.841)
Model B [GDP=f(BCP,TR)]	H0	H1	Trace statistic (Critical v.)	Maximum Eigen(Critical v.)
	r=0	$r \geq 1$	24.583 (29.797)	19.272 (21.131)
	$r \leq 1$	$r \geq 2$	5.310 (15.494)	5.106 (14.264)
	$r \leq 2$	$r \geq 3$	0.203 (3.841)	0.203 (3.841)
Model C [GDP=f(BCP,VT)]	H0	H1	Trace statistic (Critical v.)	Maximum Eigen(Critical v.)
	r=0	$r \geq 1$	35.336* (29.797)	21.941* (21.131)
	$r \leq 1$	$r \geq 2$	14.395 (15.494)	10.857 (14.264)
	$r \leq 2$	$r \geq 3$	3.537 (3.841)	3.537 (3.841)
ModelD[(GDP=f(FSC, MCAP)]	H0	H1	Trace statistic(Critical v.)	Maximum Eigen Critical v.)
	r=0	$r \geq 1$	41.074* (29.797)	19.399* (21.131)
	$r \leq 1$	$r \geq 2$	21.084* (15.494)	15.527* (14.264)
	$r \leq 2$	$r \geq 3$	5.557* (3.841)	5.557* (3.841)
Model E [(GDP=f(FSC,TR)]	H0	H1	Trace statistic(Critical v.)	Maximum Eigen (Critical v.)
	r=0	$r \geq 1$	27.572 (29.797)	19.265 (21.131)
	$r \leq 1$	$r \geq 2$	8.307 (15.494)	5.891 (14.264)
	$r \leq 2$	$r \geq 3$	2.415 (3.841)	2.415 (3.841)
Model F[(GDP=f(FSC,VT)]	H0	H1	Trace statistic(Critical v.)	Maximum Eigen (Critical v.)
	r=0	$r \geq 1$	29.767 (29.797)	17.822 (21.131)
	$r \leq 1$	$r \geq 2$	11.944 (15.494)	8.850 (14.264)
	$r \leq 2$	$r \geq 3$	3.094 (3.841)	3.094 (3.841)
Model G[(GDP=f(M3,MCAP)]	H0	H1	Trace statistic(Critical v)	Maximum Eigen(Critical v.)
	r=0	$r \geq 1$	18.254 (29.797)	10.140 (21.131)
	$r \leq 1$	$r \geq 2$	8.1137 (15.494)	5.948 (14.264)
	$r \leq 2$	$r \geq 3$	2.164 (3.841)	2.164 (3.841)
Model H[(GDP=f(M3,VT)]	H0	H1	Trace statistic(Critical v)	Maximum Eigen(Critical v.)
	r=0	$r \geq 1$	36.987* (29.797)	26.696* (21.131)
	$r \leq 1$	$r \geq 2$	10.290 (15.494)	7.987 (14.264)
	$r \leq 2$	$r \geq 3$	2.302 (3.841)	2.302 (3.841)
Model I [GDP=f(M3,TR)]	H0	H1	Trace statistic (Critical v)	Maximum Eigen (Critical v)
	r=0	$r \geq 1$	23.466 (29.797)	29.832 (21.131)
	$r \leq 1$	$r \geq 2$	3.634 (15.494)	3.168 (14.264)
	$r \leq 2$	$r \geq 3$	0.465 (3.841)	0.465 (3.841)

Notes * refers to the rejection of null hypothesis at ,5% significance level .

5.4 CAUSALITY ANALYSIS

The requirements for conducting a VECM test were that there must be co-integration vectors (error-correction terms (ECT)) between the variables in the VAR models A, C, D and H. Since this condition was satisfied the direction of causality could then be examined to suggest whether or not a stable meaningfully independent long-run equilibrium state existed. Odhiambo (2009) reiterated that for a long run causal relationship to exist between and amongst the variables in the VEC model the coefficient on the ECT must be negative and statistically significant. A statistically insignificant ECT coefficient (that is if probability values exceed a 10% threshold) indicates no long-run relationship between the series in a VEC model.

5.4.1 Long run VECM causality

The results of the long run error correction models A, C, D and H with the computed regression coefficients and critical values in parentheses are presented in Table 6. As reported in the table there was a negative long-run causal coefficient of -0.364 for model A which was statistically significant at 1 % level of significance. This confirmed evidence of long run causality from banking credit to private sector (BCP) and from market capitalization (MCAP) to economic growth (GDP). Estimates from the same model suggested an insignificant joint causality from economic growth (GDP) to market capitalisation (MCAP) and banking credit to private sector (BCP).

In model A, the long-run joint causality coefficients from GDP to banking credit to private sector (BCP) and stock market capitalisation (MCAP) carried the unexpected negative signs of -0.23 and -0.309 respectively and their corresponding probability values represented insignificant causal relationships. This implies that in model A there was no long-run joint causality from GDP to either stock market or banking sector. A critical analysis of bivariate (pairwise) causality revealed that banking credit to private sector lag 1 and 2 (BCP (-1), BCP (-2)) and stock market capitalisation lag 1 and 2 (MCAP (-1), MCAP (-2)) caused significant changes in economic growth (GDP), even though their coefficients carried unexpected negative signs. However, GDP (-1) and GDP (-2) were statistically insignificant in causing changes in banking credit to private sector (BCP) and market capitalisation (MCAP) as feedback effects. In model A it was also noted that a pairwise causal relationship running from stock market capitalisation to banking credit to private sector, although the relationship was very weak and negative.

Table 6: VECM Long run Causality Results*Source: Author's compilation from Eviews.*

	Model A: LnGDP = F (LnBCP, LnMCAP)			Lags (2)
	Dependent Variables:			
Independent variables:	(LnGDP)	(LnBCP)	(LnMCAP)	
Ln(GDP-1)		0.107(0.865)	1.905(0.116)	
Ln(GDP-2)		-0.392(0.483)	1.585(0.111)	
Ln(BCP-1)	-2.45(0.0312)		-1.329(0.54)	
Ln(BCP-2)	-0.049(0.753)		0.210(0.652)	
Ln(MCAP-1)	-0.163(0.023)	0.125(0.036)		
Ln(MCAP-2)	-0.125(0.077)	0.086(0.518)		
Joint causality (constant coeff).	-0.364(0.013)	-0.235(0.604)	-0.309(0.32)	
	Model C: LnGDP = F (LnBCP, LnVT)			Lags (1)
Independent variables:	Ln GDP	LnBCP	LnVT	
LnGDP		-0.033(0.931)	0.509(0.615)	
LnBCP	-0.128(0.416)		-0.272(0.661)	
LnVT	-0.053(0.412)	0.128(0.205)		
Joint causality(constant coeff).	-0.039(0.319)	-1.238(0.66)	0.042(0.712)	
	Model D: LnGDP = F (LnFSC, LnMCAP)			Lags (2)
Independent variables:	LnGDP	LnFsc	LnMcap	
Ln(GDP-1)		-2.127(0.15)	3.114(0.161)	
Ln(GDP-2)		1.244(0.145)	4.115(0.268)	
Ln(Fsc-1)	-0.618(0.010)			
Ln(Fsc-2)	-0.376(0.063)			
Ln(Mcap-1)	-0.116(0.011)	0.219(0.08)	1.409(0.385)	
Ln(Mcap-2)	-0.133(0.077)	0.114(0.035)	0.052(0.955)	
Joint causality (constant coeff).	-0.262(0.023)	-0.565(0.11)	-0.04(0.644)	
	Model H: Ln GDP = F (LnM3, LnVT)			Lags (1)
Independent variables:	LnGDP	LnM3	LnVT	
LnGDP		-0.063(0.875)	1.077(0.133)	
LnM3	0.102(0.389)		0.750(0.104)	
LnVT	-0.020(0.760)	0.052(0.713)		
Joint causality (constant coeff).	0.369(0.013)	-0.170(0.192)	-0.027(0.109)	

A critical assessment of Model C revealed a negative long-run causal coefficient of -0.039 for the relationship running from banking credit to private sector (BCP) and value of shares traded (VT)

to gross domestic product (GDP). The relationship was statistically insignificant at the 10% level of significance since the probability value of 31% was greater than the 5% threshold. This therefore validates co-integration between variables but with a weak long-run causality running from banking credit to private sector (BCP) and value traded (VT) to economic growth (GDP). On the other hand there was no reverse causality from GDP to banking credit to private sector (BCP) and value traded (VT), since the associated probability values of 0.6 and 0.71 were statistically insignificant. In addition, bivariate causalities for this model depicted that banking credit to private sector (BCP) and value traded (VT) did not cause any changes in GDP. No feedback effects were noted in this causal relationship either. This was confirmed by statistically insignificant coefficients of causality running from gross domestic product lag1 (GDP (-1)) to both banking credit and value traded.

Results in Model D also indicated a negative long-run joint causality coefficient, statistically significant at the 5% and 10% levels of significance from financial sector credit (FSC) and market capitalisation (MCAP) to GDP. There were no feedback effects in this model, however: in other words, GDP did not cause significant changes to either market capitalisation (MCAP) or financial sector credit (FSC) at any level of significance. Although the causal relationship from market capitalisation (MCAP) to financial sector credit (FSC) carried the correct positive sign at the 10% level of significance, the nexus was so weak that there were no feedback effects.

A deeper and lengthier analysis of pairwise causality revealed that market capitalisation lags 1 and 2 (MCAP (-1), MCAP (-2)), financial sector credit lags 1 and 2 (FSC (-1) and FSC (-2)) caused significant changes in economic growth (GDP) with no reversal causality. This indicated a unidirectional long-run causal relationship from market capitalisation and financial sector credit to GDP in Zimbabwe. Furthermore, in Model D another, unidirectional causality relationship was noted from market capitalization lag 1 and 2 (MCAP (-1) and MCAP (-2)) to financial sector credit (FSC) at the 10 % level of significance. The coefficients of this relationship carried the expected positive values even though the association between the variables was weak in the long term, however.

An examination of the joint long-run causal relationships from broad money supply (M3) and value traded (VT) to GDP in model H showed a positive and statistically significant coefficient at

the 1% level of significance. This provided evidence of the existence of a long-run causal relationship from money supply and value traded to GDP. However an insignificant joint causal relationship from GDP to broad money (M3) and value traded (VT) was observed. No long run causal relationship existed between broad money (M3) and value traded (VT) in model H. It was also noted that the bivariate (pairwise) causality estimates of Model H variables were statistically insignificant implying that there is was no causal relationship among any of the variables on a pairwise basis in this model.

5.4.2 Short-run VECM causality

Table 7 reflects VECM short-run results for the causal relationship between financial development (banking sector and stock markets) and economic growth. These results confirmed the existence of a short-run causal relationship from economic growth to financial development at the 5% level of significance. With the error correction term carrying the correct statistically significant negative coefficient in banking credit, money supply, financial sector credit and market capitalisation functions (see Table 7), it could be confirmed that a stable short-run relationship existed between the variables in the Models A, C, D and H. The results of these functions supported the co-integration results confirming the existence of an equilibrium relationship between the variables of these models in Zimbabwe. This explained the presence of a causal linkage running from economic growth to financial development in the dynamic VEC Models A, C, D and H.

Short-run tests also revealed that jointly broad money supply (M3), financial sector credit (FSC), banking credit (BCP), market capitalization (MCAP) and, turnover ratio (TR) were strongly and significantly caused by GDP across Models A, C, D and H. Thus the null hypothesis of no short run joint causality was accepted for the causality from broad money (M3), banking credit (BCP), market capitalisation (MCAP), value traded (VT) , financial sector credit (FSC) to GDP . In terms of the individual (pairwise) causalities, the short-run causality tests revealed that economic growth (GDP) significantly and uni-directionally caused changes in financial development. This was supported by the causal coefficients, which indicated that the relationship was statistically significant and it ran from GDP to financial development variables (BCP, M3, MCAP, TR, FSC) not vice versa on a pairwise basis. For instance, in Model A, since the P value of 0.060 was less than 10% with a positive coefficient in the relationship between the GDP and banking credit (BCP), a statistically significant relationship could be confirmed.

Table 7: Short run causality test results from Wald block X² tests*Source: Author's Compilation from Eviews*

However, the reverse causal relationship did not allow the same conclusions to be drawn. As indicated in Model A, bank credit (BCP) did not cause changes in GDP. In other words, the

Model A: LnGDP = F (LnBCP, LnMCAP)				Lags (2)
Dependent Variables:				
Independent variables:	(LnGDP)	(LnBCP)	(LnMCAP)	
Ln(GDP)		0.614(0.073)	4.971(0.083)	
Ln(BCP)	1.296(0.523)		7.476(0.23)	
Ln(MCAP)	8.491(0.14)	1.634(0.0201)		
Joint causality coefficient	8.522(0.14)	6.57(0.060)	9.405(0.051)	
Model C: LnGDP = F (LnBCP, LnVT)			Dependent Variables:	Lags (1)
Independent variables:	Ln GDP	LnBCP	LnVT	
LnGDP		0.007(0.0930)	0.260(0.609)	
LnBCP	0.687(0.406)		0.197(0.656)	
LnVT	0.701(0.402)	1.713(0.0190)		
Joint causality	3.081(0.214)	1.745(0.0417)	0.350(0.839)	
Model D: LnGDP = F (Ln FSC, LnMCAP)			Dependent Variables:	Lags (2)
Independent variables:	Ln(GDP)	Ln(Fsc)	Ln(Mcap)	
Ln(GDP)		15.938(0.0003)	2.409(0.0299)	
Ln(Fsc)	9.244(0.98)		2.218(0.329)	
Ln(Mcap)	5.104(0.77)	3.733(0.0154)		
Joint causality (all variables)	18.79(0.9)	19.165(0.0007)	6.166(0.187)	
Model H: Ln GDP = F (LnM3, LnVT)			Dependent Variables:	Lags (1)
Independent variables:	LnGDP	LnM3	LnVT	
LnGDP		2.138(0.0343)	2.43(0.118)	
LnM3	0.770(0.379)		2.87(0.09)	
LnVT	0.095(0.757)	6.052(0.048)		
Joint causality (all variables)	0.771(0.680)	9.460(0.050)	4.924(0.85)	

relationship, although carrying a negative coefficient, was statistically insignificant at the threshold of 5% level of significance.

In Models C, D and H, the corresponding probability values for the individual causality from GDP to banking credit to the private sector (BCP), financial sector credit (FSC) and money supply(M3) were 0.093, 0.0003 and 0.034 respectively. It is thus clear that a unidirectional short-run causality running from economic growth to financial development existed in Zimbabwe in the period understudy.

Despite negative coefficients in bivariate causality between market capitalization (MCAP) and bank credit (BCP), market capitalization (MCAP) and financial sector credit (FSC) and, value traded (VT) and money supply (M3), the associated t-statistic values were statistically significant. Thus the null hypothesis of non-existence of short-run causality from stock market development to banking sector development in Zimbabwe could be rejected at the 5% level. Only one variable of banking sector development that is money supply (M3) confirmed the reverse relationship from money supply (M3) to value traded (VT) with a statistically significant P value of 0.09 in model H.

In the short-run a critical analysis of direction of causality for both joint and individual relationships revealed that GDP caused changes in all financial development variables at a 5% level of significance. This implies that short-run causality ran from economic growth to financial development (bank and stock market development) in Zimbabwe.

5.4.3 Diagnostic tests

Diagnostic test were conducted in this study in order to examine the efficiency, accuracy and reliability of VECM causality models. These tests included those for serial correlation, normality and heteroskedasticity in model A, C, D and H. The results showed that at two lags there was no serial correlation, residuals were normally distributed and there was no presence of heteroskedasticity in these models.

5.5 ROBUSTNESS TEST

A robustness test was conducted in order to examine the magnitude of the relationship between banking sector, stock market development and economic growth. This was done by applying the auto regressive distributed lag (ARDL) bound testing approach. The accuracy of the ARDL model in estimation depends on optimum lags being selected.

The study therefore used both the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion to select the optimum number of lags before conducting the F bounds test of co-integration at the optimum lag. This was done in order to avoid the susceptibility of the F tests estimates to lag length choices (Bahmani-Oskooee and Karacal, 2006). The optimum lag was then determined as stipulated by Bahmani-Oskooee and Karacal (2006) where the Akaike Information

Criterion (AIC), Schwarz Information Criterion(SIC), Hannan-Quinn Information Criterion(HQ), Final Prediction Error (FPE) and Sequential Modified LR (LR) test were applied in determining the most appropriate lag length. All these tests supported a lag length of two after running the ARDL model.

5.5.1 F - Bounds Co-integration test

The ARDL F-bounds analysis was modelled using k (as $1 + \text{lag length}$) at a 5% level of significance. The results in Table 8 were obtained using the unrestricted intercept and no trend error correction model. In the Pesaran et al (2001) table for critical upper $I(1)$ and lower $I(0)$ bounds this model specification falls under case III.

Table 8 indicates that the null hypothesis of no co- integration between the variables in Models A, C, D, F and G was rejected at the 5% level of significance. This means that there was a long-run co-integration nexus between and amongst the proxies of banking sector development, stock market development and economic growth represented by these models. If the F statistic is more than the upper bound value the null hypothesis of no co-integration is rejected Odhiambo (2011).

In Model A, since the F statistic of 11.2 is greater than 5.61, the alternative hypothesis validating the existence of a long run relationship between banking sector and stock market development was accepted at all levels of significance. Table 8 also indicates that in Models B, E, H and I there was no co-integration between or amongst the variables since the respective F statistics fell below the given critical values at all levels of significance. As a result these models were omitted from the analysis of the relationship between finance and growth variables in this study.

Table 8: F Bounds ARDL Co-integration test results

ARDL Model Equations		F-statistic	K	Asymptotic Critical Values						Outcome
				1%		5%		10%		
				I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
A	LnGDP=f(lnMCAP,lnBCP)	11.2*	3	2.72	3.77	3.23	4.35	4.29	5.61	Co-integration
B	LnGDP=f(LnBCP,LnTR)	2.062	2	3.17	4.14	3.79	4.85	5.15	6.36	No co-integration
C	LnGDP=f(LnBCP,LnVT)	6.21**	2	3.17	4.14	3.79	4.85	5.15	6.36	Co-integration
D	LnGDP=f(lnMCAP,lnFSC)	7.13*	3	2.72	3.77	3.23	4.35	4.29	5.61	Co-integration
E	LnGDP=f(LnFSC,LnVT)	1.748	2	3.17	4.14	3.79	4.85	5.15	6.36	No co-integration
F	LnGDP=f(LnFSC,LnTR)	5.25**	2	3.17	4.14	3.79	4.85	5.15	6.36	Co-integration
G	LnGDP=f(LnM3,lnMCAP)	16.6*	3	2.72	3.77	3.23	4.35	4.29	5.61	Co-integration
H	LnGDP=f(LnM3,LnTR)	2.415	3	2.72	3.77	3.23	4.35	4.29	5.61	No co-integration
I	LnGDP=f(LnM3,LnVT)	1.886	2	3.17	4.14	3.79	4.85	5.15	6.36	No co-integration

Source: Author’s compilation from Eviews Critical values are from Pesaran (2001) on page 300, Table CI (iii) CaseIII unrestricted no trend. * , ** , *** represents 10%, 5% and 1% level of significance respectively.

5.5.2 Long-run ARDL estimates

The results of the long-run causality coefficients in Models A, C, D, F and G and critical values in parentheses are presented in Table 9. As reflected in Table 9, there was a distinct long-run causal flow from stock market and banking credit to economic growth in Model A. This is supported by the coefficient of lagged values which is positive (12.54) and statistically significant at 1% level of significance indicating that in Model A there was a positive relationship from financial development (stock market and banking sector developments) to economic growth. A critical pairwise analysis revealed that there was no joint causality from economic growth (GDP) to either banking credit (BCP) or market capitalisation (MCAP) in Zimbabwe for the period 1988-2015.

Table 9: ARDL Model Estimates of Long-run Causality Coefficients

Model A: LnGDP = F(LnBCP, LnMCAP)				Lags (2)
Dependent Variables:				
Independent variables:	(LnGDP)	(LnBCP)	(LnMCAP)	
Ln(GDP-1)		0.123(0.822)	2.028(0.124)	
Ln(GDP-2)		-0.814(0.105)	1.454(0.183)	
Ln(BCP-1)	-0.138(0.057)		-0.796(0.409)	
Ln(BCP-2)	0.0179(0.090)		0.480(0.427)	
Ln(MCAP-1)	-0.1076(0.015)	0.224(0.09)		
Ln(MCAP-2)	-0.1009(0.014)	0.042(0.0709)		
Joint causality constant coeff.	12.54(0.0092)	-1.517(0.829)	-20.052(0.287)	
Model C: LnGDP= F (LnBCP, LnVT)				Lags (1)
Independent variables:	Ln GDP	LnBCP	LnVT	
LnGDP		-0.317(0.439)	0.898(0.463)	
LnBCP	-0.017(0.948)		-0.458(0.709)	
LnVT	-0.023(0.718)	0.128(0.199)		
Joint causality constant coefficient	9.912(0.033)	0.937(0.86)	8.987(0.657)	
Model D: LnGDP = F(Ln FSC, LnMCAP)				Lags (2)
Independent variables:	LnGDP	LnFsc	LnMcap	
Ln(GDP-1)		-2.983(0.0017)	2.579(0.244)	
Ln(GDP-2)		-2.266(0.0047)	3.83(0.295)	
Ln(Fsc-1)	-0.408(0.257)		0.913(0.578)	
Ln(Fsc-2)	-0.256(0.031)		-0.282(0.765)	
Ln(Mcap-1)	-0.057(0.058)	0.011(0.947)		
Ln(Mcap-2)	-0.105(0.020)	0.018(0.089)		
Joint causality constant coefficient	10.755(0.01)	-17.756(0.108)	-46.50(0.61)	
Model F: Ln GDP = F(LnFSC, LnTR)				Lags (1)
Independent variables:	LnGDP	LnFSC	LnTR	
LnGDP		-1.071(0.007)	0.954(0.03)	
LnFSC	-0.029(0.086)		-0.909(0.005)	
LnTR	0.180(0.018)	0.176(0.035)		
Joint causality; constant coefficient	9.092(0.055)	-6.319(0.032)	-10.729(0.151)	
Model G: LnGDP = F(LnM3, LnMCAP)				Lags (1)
Independent variables:	(LnGDP)	(LnM3)	(LnMCAP)	
Ln(GDP)		0.067(0.939)	1.53(0.278)	
Ln(M3)	-0.306(0.003)		0.308(0.720)	
Ln(MCAP)	-0.004(0.092)	-0.108(0.580)		
Joint causality coefficient	22.01(0.0001)	-2.847(0.865)	-30.29(0.496)	

Source: Authors' compilation from Eviews

Another unique yet very significant long run causal flow was discovered running from market capitalisation (MCAP) to banking credit (BCP). This flow was validated by positive lags 1 and 2 coefficients with corresponding probability values of 0.07 and 0.09 respectively on a pairwise

basis. Moreover, many related findings are noted as well for the pairwise causality from BCP and MCAP to GDP in Model A, where significant causal flow runs from stock market capitalisation and banking credit to economic growth at 10% level of significance. This result did not apply in the case of gross domestic product (GDP) to banking credit (BCP) and market capitalisation (MCAP) in the same model, however, since the probability values of 82% and 12 % were greater than 10%. In the same line of analysis banking credit lags 1 and 2 (BCP (-1) and BCP (-2)) were identified as insignificantly promoting changes in MCAP. This implies that no causal relationship existed from BCP to MCAP at any level of significance in Model A.

Model C revealed a significant joint causal relationship from banking credit (BCP) and value traded (VT) to GDP at 5% level of significance with no feedback effect for either pairwise or joint causality estimates of the model. An insignificant long-run relationship therefore exists from GDP to banking credit (BCP) and value traded (VT). In addition, Model C showed no causal relationship between banking credit (BCP) and value traded (VT) either jointly or on bivariate basis. This was supported by statistically insignificant lagged values in that same model. On the other hand, Model D revealed a positive yet statistically significant long-term joint causal relationship from financial sector credit lag 2 (FSC(-2)), market capitalisation lag 1 and 2 (MCAP (-1) and MCAP (-2)) to GDP.

A closer examination of the pairwise causality from GDP to financial sector credit lag 1 and 2 (FSC (-1) and FSC (-2)) revealed some feedback effects from GDP to financial sector credit and vice versa. This was validated by a significant long run causal coefficient at 1% level of significance from GDP to financial sector credit (FSC (-1) and FSC (-2)) with corresponding probability values of 0.0017 and 0.0047 respectively. In the same model MCAP (-2) only caused significant changes in financial sector credit at the 10 % level of significance with, neither joint nor bivariate causality from GDP to market capitalisation (MCAP (-1) and MCAP (-2)).

Model F displayed a significant joint causality from financial sector credit (FSC) and turnover ratio (TR) to GDP with the long-run coefficient carrying the expected positive sign. The positive sign indicates a direct joint relationship from FSC, TR to GDP. Unlike others in Model F showed no evidence of pairwise causality from either financial sector credit (FSC) or turnover ratio (TR) to GDP. The only feedback effects revealed were the bivariate causalities running from GDP to

both turn-over (TR) and financial sector credit (FSC) at the 5% level of significance. A negative relationship was noted from financial sector credit to turnover ratio at the 1% level of significance in Model F. This implies that financial sector credit was inversely related to turn over ratio. In other words a 100% increase in FSC would lead to a 90.9% decrease in turnover ratio in Zimbabwe.

On the other hand a very strong joint causal relationship existed from M3 and MCAP to GDP at the 1% level of significance in Model G. The causal flow supported a positive long-run coefficient associated with a corresponding probability of 0.0001. This confirmed the existence of a very significant causal relationship from banking sector and stock market variables to GDP, without any feedback effects. As in all the other models, GDP neither jointly nor individually caused changes in M3 and MCAP at any significance level. In this model the only variable which has depicted a unidirectional significant pairwise causality to GDP at 1% level of significance was money supply (M3). Nonetheless, no relationship appeared to exist between MCAP and GDP in this Model at any level of significance.

5.5.3 Short-run Wald test

Table 10 below shows results of the short-runs causal relationships between banking sector and stock market variables in ARDL Models A, C, D, F and G. The results for short-run tests in Table 10 show that the modelled error correction term (ECT (-1)) was negative and significant validating the existence of co-integration amongst the variables in Models A, C, D and F. Although a stable and constant relationship was confirmed in these models, the feedback coefficients were rather low for sustainable equilibriums to be achieved. The ECT coefficients of -0.048, -0.33, -0.138, -0.265 and -0.148 for Models A, C, D and F respectively suggests a fairly low speed of adjustment to equilibrium after a shock in the Zimbabwean macroeconomic variables. In other words the Zimbabwean economic disequilibrium was corrected by changes in stock market and banking sector variables at the lowest speed of 4.5% which indicates a very weak rate of adjustment to stable equilibriums with time.

Table 10: ARDL Short Run Causality Results

Model A: LnGDP = F(LnBCP, LnMCAP)				2lags
Dependent Variables:				
Independent variables:	(LnGDP)	(LnBCP)	(LnMCAP)	
Ln(GDP)		0.185(0.086)	1.225(0.045)	
Ln(BCP)	-0.325(0.2)		-0.165(0.39)	
Ln(MCAP)	-0.134(0.12)	0.298(0.005)		
Joint causality ECT coefficient		-0.048(0.0696)		
Model C: LnGDP= F(LnFSC, LnVT)		Dependent Variables:		1 lag
Independent variables:	Ln GDP	LnBCP	LnVT	
LnGDP		0.12(0.78)	0.384(0.913)	
LnBCP	-0.23(0.402)		-0.48(0.668)	
LnVT	-0.115(0.472)	0.528(0.05)		
Joint causality ECT coefficient		-0.336(0.029)		
Model D: LnGDP = F(Ln FSC, LnMCAP)		Dependant variables		2 lags
Independent variables:	Ln(GDP)	Ln(Fsc)	Ln(Mcap)	
Ln(GDP)		-1.93(0.017)	-0.122(0.583)	
Ln(Fsc)	-0.408(0.07)		-0.913(0.518)	
Ln(Mcap)	-0.120(0.142)	-0.013(0.0942)		
Joint causality ECT coefficient		-0.138(0.0316)		
Model F: Ln GDP= F(LnFSC, LnTR)		Dependant variables		1 lag
Independent variables:	LnGDP	LnFSC	LnTR	
LnGDP		-0.687(0.035)	0.954(0.065)	
LnFSC	-0.171(0.584)		-0.281(0.006)	
LnTR	0.08(0.714)	-0.263(0.006)		
Joint causality ECT coefficient		-0.265(0.0134)		
Model G: Ln GDP= F(LnM3, LnMcap)		Dependant variables		1 lag
	LnGDP	LnM3	LnMCAP	
LnGDP		-0.217(0.95)	1.298(0.560)	
LnM3	-0.131(0.9)			
LnMCAP	-0.003(0.871)	-0.15(0.814)	0.347(0.837)	
Joint causality ECT coefficient		-0.148(0.497)		

Source: Author's compilation from Eviews

When examining the short run individual causalities the following hypotheses were tested as specified in Table 11 below.

Table 11: Short-run hypothesis specification

Ho: Hypothesis: Short-run non Causality	H1: Hypothesis: Short run Causality
Ho: $\text{Ln}\alpha_1 = \text{Ln}\alpha_2 = 0$	H1: $\text{Ln}\alpha_1 = \text{Ln}\alpha_2 \neq 0$
Ho: $\text{Ln}\alpha_3 = \text{Ln}\alpha_4 = 0$	H1: $\text{Ln}\alpha_3 = \text{Ln}\alpha_4 \neq 0$
Where $\alpha_{1,2,3,4}$ are different finance and growth model variables.	
Criterion: if P value is less than 5% reject H0.	

Table 11 indicates that the null hypothesis of no causality between market capitalisation (MCAP) and bank credit (BCP) (represented as $\text{MCAP} = \text{BCP} = 0$) was rejected at 5% level of significance, with the conclusion that stock market development cause changes in banking sector development in the short run. Since the probability value of 5.3% was less than 10%, it was concluded that there was a short run causality running from stock market capitalisation to banking sector development in Zimbabwe in Model A. On the other hand, with a probability value of 39% which is more than 5%, a null hypothesis of no causality from bank credit (BCP) to market capitalisation (MCAP) (represented as $\text{BCP} = \text{MCAP} = 0$) was accepted at 5% level of significance. Based on these results, it can therefore be deduced that no causal relationship exists in the short run from banking credit to market capitalisation at any level of significance.

On the other hand the short run tests showed that a null hypothesis of no causality ($\text{GDP} = \text{BCP} = \text{MCAP} = 0$) was rejected at the 10% level of significance. This indicates that a unidirectional yet statistically significant short-run causal relationship, running from GDP to market capitalisation (MCAP) and bank sector credit (BCP) existed in Model A. This was validated by the respective probability values of 0.08% and 0.04% which were less than the threshold of 10%. In addition, a negative short-run causal relationship between stock market capitalisation (MCAP) and banking sector credit (BCP) was found, with a 0.298 lag coefficient. This implies that a 100% increase in banking sector development lead to a 29.8 % decline in stock market development per annum. This result was not in line with the theoretical model expectations of Model A since it was assumed that banks positively promote stock markets.

Models C, D, F and G demonstrated that causality runs from GDP to banking sector and stock market variables and, then from stock market development to banking sector, although the latter

depicted a very weak association between the variables. For instance, in Model C, only VT caused changes in banking sector credit (BCP) at the 5% level of significance while GDP did not cause any changes in BCP. In Model D a very strong causal relationship existed running from GDP to financial sector credit (FSC) at the 1% level of significance with some feedback effects. In the same model market capitalization (MCAP) caused weak changes in financial sector credit (FSC) at the 10% level of significance. Results also showed that in Model F, GDP caused significant changes in financial sector credit (FSC) and turnover ratio (TR) with no reverse causality. Turnover ratio (TR) also brought about changes in FSC with no feedback effects at the 10% level of significance. A critical analysis of Model G, however, indicated no short-run causality amongst any variables (that is economic growth (GDP), money supply (M3) and market capitalisation (MCAP)).

5.5.4 Model diagnostics

This study conducted a misspecification test as recommended by Dritsaki and Dritsaki- Bargiota (2005), which included the residual autocorrelation, normality, heteroskedasticity test. These tests were carried out to ensure data admissibility and conformance of the dynamic responses of variables to the theoretical postulations in this study. The residuals tested for normality were estimated by applying the Jarque- Bera statistic. Results showed that residuals were normally distributed for the models A, C, D, F and G. These residuals were further tested for serial correlation and heteroskedasticity by employing the Breusch-Godfrey serial correlation LM test (Gregory and Hansen, 1996) and White's heteroskedasticity test respectively. Results from these tests revealed that there was neither serial correlation in the ARDL model nor presence of heteroskedasticity at lag length two.

In addition, the regression for the underlying ARDL model also fits very well at R square = 83.2%. Satisfaction of this condition further authenticated the model allowing it to pass diagnostic tests against serial correlation, normality and heteroskedasticity at the 5 % level of significance. A closer inspection of the cumulative sum (CUSUM) graph from the recursive estimation of the models A, C, D, F and G revealed that the models were stable and that no systematic change detected in the coefficient at the 5% significance level over the sample period.

5.6 CONCLUSION

This chapter reported on the econometric estimation conducted and provided a discussion of the empirical findings of the study. The estimated results were obtained by using the vector error correction model (VECM) and the autoregressive distributed lag (ARDL) approach to estimate long and short-run relationships between banking sector, stock market and economic growth. The major findings were that a significant causal relationship existed from BCP, FSC, M3, and TR, VT, MCAP to GDP jointly with no reverse causality effects. On the other hand a joint negative causal relationship was found from GDP to banking sector and stock market development in the short run in Zimbabwe. The relationship between banking sector variables (BCP, FSC, M3) and stock markets variables (TR, VT, MCAP) was found to be more significant in the short run than in the long run. The next chapter affirms the findings by taking the analysis further in order to make conclusions, recommend economic policies and highlight areas for future research.

CHAPTER 6: CONCLUSION AND POLICY IMPLICATIONS

6.1 INTRODUCTION

This chapter presents a summary of the findings, the conclusions, policy implications, limitations of the study, and suggestions of areas for further research in the context of Zimbabwean macroeconomic conditions. The major objective of this study was to investigate empirically the relationship between banking sector and stock market development and their combined impact on economic growth in Zimbabwe. The study employed the vector error correction model (VECM) to establish comprehensively the causal relationship between banking sector, stock market and economic growth. It also applied the autoregressive distributed lag (ARDL) bounds testing approach to co-integration analysis popularised by Pesaran et al. (2001). The ARDL approach was used as a robustness test technique to establish the magnitude of the long-run relationship between banking sector, stock market development and economic growth.

An empirical modelling technique using Johansen and Juselius (1990), the co-integration approach took into consideration the maximum eigen-values and trace statistic tests. This was followed by the granger causality Wald block test which was conducted under both the VECM and the ARDL models. The rest of the chapter is structured as follows: section 6.2 provides a summary of empirical findings followed by their contributions to the literature on financial development and the light they throw on the paucity of literature on the implementation of economic policies in section 6.3. Section 6.4 discusses the main conclusions of the study while recommendations based on the study are presented in section 6.5. Limitations to the study are discussed in section 6.6 and suggestions for future research in section 6.7.

6.2 SUMMARY OF EMPIRICAL FINDINGS

The results of the unit root tests suggest that all variables were stationary at first difference in Zimbabwe time series data ranging from 1988 to 2015. Co-integration results suggested that there were at most three co-integrated vectors among the variables used in modeling. On the other hand, the estimated models, demonstrated that the error correction terms in the relationship between stock market development, banking sector and growth were negative and statistically significant. This provides evidence confirming co-integration while further supporting the existence of equilibrium long-run relationships among the variables employed in the models.

Empirical findings on the finance-growth nexus revealed that the demand-following hypothesis (growth follows banking sector and stock market development) was not generally validated by time series analysis when examined from a different methodological perspective. The demand-following theory therefore failed to hold when taking into account the experience of Zimbabwean macroeconomic variables. In this study the results revealed that banking sector and stock market development caused changes in economic growth but not vice versa; and this may be attributable to a deficiency in entrepreneurial activities in Zimbabwe (Jecheche, 2010).

The impacts of banking sector and stock market development (financial development) on growth are contingent on the capacity of the private sector to engender banking credit and the creation of money, while at the same time bolstering the quality of investment projects for positive sustainable growth in Zimbabwe. Thus the empirical investigation in this study suggests that in Zimbabwe the long run causal relationship runs from stock market development and banking sector (financial development) to economic growth while, in the short run, economic growth caused changes in banking sector and stock market development.

In the long run, the causality runs from banking sector and stock market development to economic growth lending support to the supply-leading hypothesis in Zimbabwe. These findings are consistent with the postulations of Ziwengwa et al. (2011), Adhlakun (2010), Sasilu (2014), Ang (2008), Kadenge and Tafirei (2014) and Tsaurai and Odhiambo (2012). Tsaurai and Odhiambo's (2012) results were in support of the supply leading hypothesis for Zimbabwe from 1980 to 2012. Kadenge and Tafirei (2014) added to this finding that a steady long-run causal relationship existed from financial development to economic growth in Zimbabwe. The banking sector was found to be having a more profound effect than stock market development in Zimbabwe between 1988 and 2012, however. In Nigeria, findings of a study by Adhlakun (2010) and Sasilu (2014) also supported the supply-leading hypothesis by arguing that the long-run unidirectional relationship runs from financial development to economic growth in Nigeria. These findings run counter to those of Guryay et al. (2007), however, who demonstrated that in Cyprus causality runs from economic growth to financial development. Osuji and Chigbu (2012) and, Samson and Elias (2010), found a bi-directional causal relationship between economic growth and financial development.

In the short run, the results indicated that causality runs from economic growth to financial development (banking sector and stock market development) in Zimbabwe from 1988-2015. These results are consistent with findings by Al Fayoumi (2009), Berthelemy and Varoudakis (1995), Robison (1952), Odhiambo (2009), Vazakidis and Adamopolous (2009), Jecheche (2010), Ndlovu (2013) and Phadhan et al. (2014). Ndlovu (2013) and Phadhan et al. (2014) all in their respective investigations followed the same line of argument, that economic growth creates a financial services demand and that the financial system provides a spontaneous response to this demand, in the process of which financial system development is created. Ishioro (2013) concluded that in the long term, economic growth causes banking sector development but not vice versa attributing this to a lack of good quality investment projects in developing countries like Zimbabwe.

Bethelemy and Varoundakis (1995) stipulated that the effect of financial development on short - run growth is conditioned by the existence of an active and innovative private sector in the real economy. In this study empirical short-run results were inconsistent with findings by Schumpeter (1912), Hicks (1969), Mckinnon (1973), Levine et al. (2000), Yucel (2009) and Menya et al. (2014), who all provided arguments in support of the supply-leading hypothesis. On the other hand, the robustness test results for the nexus between banking sector, stock market development and economic growth confirmed similar findings in this study which suggest a unidirectional causal relationship in the long run from financial development to growth. In the short run the robustness tests also validated similar conclusions that causality runs from stock market development to banking sector with no feedback effects.

This relationship was more significant in the long-run than the short-run. The weak, insignificant negative relationship from stock market development to banking sector in Zimbabwe in the short-run can be attributed to strict controls on capital movements, speculative investment resulting from the hyperinflationary situation, low incomes and lack of knowledge among the population on stock market operations. This had the effect of downsizing investments levels through stock markets, with the result that they made an insignificant contribution to banking development. Studies consistent with this view include those by Hyndroyiannis et al. (2005), Al Fayoumi (2009), Kadenge and Tafirei (2014) and Pradhan et al. (2014). The weak relationship between banking credit to private sector, stock market capitalisation and growth in Zimbabwe may have been largely due to the hyperinflationary environment which wiped out domestic savings, leading to

profound disintermediation as people moved to the parallel market for financial services (Kadenge and Tafirei, 2014; Hyndroyiannis et al., 2005).

Pradhan (2013) supported the results and further notes that insignificant contributions by stock markets development to banking sector affects the relationship between banking sector and stock markets, as financial sector developments may not keep pace. This means that banks are the only organized financial markets through which funds from the poor communities are pooled together in Zimbabwe. Furthermore, banks have a more profound yet broader infrastructure across the whole economy which engenders their capability to mobilise investable funds. All these factors result in a mismatch between the contributions by the stock market and the banking sector to the national cake leading to a negative relationship between the two (Al-Fayoumi, 2009).

The contribution made by banks to the real sector and stock markets was constrained by the disintegration that occurred during the hyperinflationary period. This disintegration decreased domestic savings substantially, leading to the collapse of most locally owned Zimbabwean banks, as people had lost confidence in the financial sector (Ziwenga, et al., 2011). In the long run, this disequilibrium and other negative effects were corrected and banks restarted contributing positively to financial development. Although a negative relationship between stock market and banking sector was not consistent with the expectations of the theoretical model, such relationships have been supported by Rioja and Valev (2004), who revealed that stock markets did not contribute towards banking capital accumulation in low income countries from 1980-2009. This was also supported by the findings of Obstfeld (1998) and Bhide (1993) who cautioned about the possible negative effects that development in stock markets might have in the economy.

The weak association between banking sector (BCP) and stock market variables in Zimbabwe may be a reflection of the strict exchange control regulations imposed to prevent possible capital outflows as result of the Fast Track Land Reform Programme and Indigenisation and Economic Empowerment Policy (RBZ, 2014). These imposed severe restrictions on investments and the acquisition of capital resources in corporates both banking and non-banking (Ziwenga et al., 2011). The hyperinflationary situation also led to a negative real return on investments in money and capital markets (ZIMSTATS, 2012). These developments led to a market capitalisation to GDP ratio that was not supported by trading, resulting in a more speculative investment drive. This led

eventually to the suspension of ZSE trading in late 2008. The weak yet insignificant causality in the Zimbabwean finance and growth nexus is supported by Lucas (1988), Pradhan et al. (2014), Stern (1989) and Mukhopadhyay et al. (2011). Mukhopadhyay et al (2011) found no evidence of causality from stock market development to banking sector while taking into account economic growth effects. Stern (1989) argued that the role of financial development in the growth process is insignificant; therefore both the finance-led growth and the demand-following hypotheses in this study were considered null and void.

6.3 CONTRIBUTION OF THE STUDY

A multivariate causality framework of banking sector, stock market development and economic growth represents a unique study in the Zimbabwean context. No other study has ever featured the same research methodologies, design, objectives or delimitations. While several studies have been conducted on much related finance-growth topics, none have covered the overall financial sector efficiency, depth or sophistication. The majority of these studies have merely examined financial sector liquidity, size and volatility. One example is the study conducted by Ishioro (2013) which looked at stock market liquidity and volatility in Zimbabwe from 1990 to 2010. The present study thus contributes to a new body of knowledge by focusing not only on size and liquidity but also on financial sector depth and efficiency using measures of overall financial sector efficiency (ratio financial Sector Credit to GDP).

In addition, no study has as yet applied a combination of three different banking sector variables and three stock market development variables simultaneously when investigating finance-growth relationships in Zimbabwe. A few scholars who have studied this area have used only one or two proxies for either for banking sector or stock market development. For instance, Tsaurai and Odhiambo (2012) used stock market capitalisation and the ratio of savings to GDP variables to proxy financial development in Zimbabwe from 1980-2012 while Ziwengwa et al. (2011) used stock market capitalization as a proxy for stock market size in Zimbabwe. In a study on the role of multinational banks in the Zimbabwean economy, Ndlovu (2013) used bank assets as a measure of banking sector development. Mutenheri and Green (2002) used the ratio of M3 to GDP, capital structure ratios and market capitalisation to investigate the impact of financial reforms on Zimbabwe's financial sector. In their study on the impact of stock market wealth on consumption

in Zimbabwe from 1994 to 2008, Bindu et al. (2009) used the interest rates on savings and market capitalisation to proxy financial development.

This study differs too from studies that have researched on financial development and growth in Zimbabwe, in that it conducted econometric and robustness tests using a combination of two varied estimation techniques. It is for this reason that this current study claims to be unique, outstanding and distinct from others. The VEC model was applied as a primary technique and the ARDL technique as a robustness testing technique to estimate and validate the magnitude of the finance–growth relationship in Zimbabwe.

Moreover, studies that have focused on similar research areas in Zimbabwe have only employed one primary estimation technique with rather than a combination of two or more techniques in order to perform robustness tests. To mention but a few, Kadenge and Tafirei (2014) in their study on the impact of banks and stock market development on growth from 1988 to 2012 used the ARDL approach to estimate long run relationships. In their study on financial development and economic growth from 1975 to 2008, Ogwunike and Salisu (2014) applied one technique, the Bounds testing technique. Abu-Mhareb (2011) used the VECM technique to estimate the relationship between stock market, banks and economic growth, while Tsauroi (2013) used only the case study methodology when testing the savings-led growth hypothesis for Zimbabwe from 1980 to 2011. A study by Ishioro (2013) on stock market development and economic growth in Zimbabwe also used only one technique, the Toda and Yamamoto test, and no robustness tests. The current study thus makes a significant contribution to new knowledge by using two different estimation techniques and six different variables in examining the robustness of the finance-growth nexus.

6.4 CONCLUSION

The results of this study revealed that, in Zimbabwe, a unidirectional causal relationship from banking sector and stock market development to economic growth existed in the long-run. The positive development in the banking sector had a significant influence economic growth in the long-run, despite a negative and statistically insignificant second lag impact of stock market development on growth. This conclusion is consistent with the findings of Schumpeter (1912), Hicks (1969), Mckinnon (1973), Adelakun (2010), Tsauroi and Odhiambo (2012), Ziwengwa et

al. (2011)), Owusu (2012), Menyah et al. (2014) and Ogwumike and Salisu (2014). Ogwumike and Salisu (2014) postulated that banking credit to private sector, stock market and financial reforms exert a significant positive impact on economic growth. A study by Ndako (2008) supports this positing that financial development plays a critical role in promoting economic growth in South Africa. Moreover, Owusu (2012) shared the same view that economic growth is more positively related to banking sector development than stock market development in ECOWAS countries, but that causality runs from financial development to economic growth.

On the other hand, no causal relationship was found in Zimbabwe between economic growth and stock market development represented by valued traded. These results are consistent with argument by Al-Fayoumi (2009) which stipulates that stock markets in emerging countries are inefficient in their information brokerage roles in the economy and therefore do not rationally indicate changes in economic growth. Zimbabwe can be regarded as an economy which is still in the transition period, based on what is called the threshold-effects proposition (Bethelmy and Varoudakis, 1995; Herwartz, and Walle, 2014). According to Herwartz and Walle (2014) an economy which is in the transition period must reach a certain level of financial development (a threshold) before a significant effect on economic growth can occur and this is the case in Zimbabwe.

Capasso (2008) agrees that the existence of threshold effects may lead to multiple equilibria between finance and growth in the long run. He assumes that the interaction between financial and real sectors generates two stable equilibria: a low equilibrium with weak growth performance and an underdeveloped financial sector, and a higher equilibrium with notable growth and normal development of the financial market. An unstable equilibrium will thus fall between the two, thereby defining the threshold effect of the financial development on growth. Duration of the transition depends on factors such as local and international economic and political conditions, stability of macroeconomic factors (external debt, inflation, financial reserves and exchange rate), the speed of implementing financial reforms and economic adjustment programmes and others. Bethelmy and Varoundakis (1995) showed further that stock markets tend to emerge and develop only when economies reach a reasonable size and with a high level of capital accumulation. This was the situation prevailing in Zimbabwe during the period investigated in this study: stock market contributions appeared to affect economic growth insignificantly and negatively.

In the short run, a negative and statistically significant causal relationship runs from economic growth to banking sector and stock market development in Zimbabwe. These results are consistent with the argument in support of the demand-following hypothesis, which posits that financial development is an outcome of the growth in the real economy (Sasilu 2014). This view was originally conceptualised theoretically by Robinson (1952) who argued that “where enterprise leads, finance follows”. Support of this view can also be found in the theoretical works of Friedman and Schwartz (1963) and Demetriades and Hussein (1996) who concluded that causation runs from real GDP to financial development through the demand for money theorem. A number of empirical studies have validated the demand-following hypothesis among them Gurgay et al. (2007), Hou and Cheng (2010), Darrat et al. (2006), Caporale et al. (2004), Shahnoushi et al. (2008), Owusu (2012), and Sasilu (2014). Jecheche (2010) and Ndlovu (2013) discovered that in Zimbabwe, economic growth caused banking sector development in the short run but not vice versa. This was attributed to a lack of high quality investment projects in a country that is still underdeveloped.

The study further concludes that there is a unidirectional causal relationship running from stock market development to banking sector in Zimbabwe in both short and long-run periods, although this relationship has been found to be more significant in the short run than in the long run. The insignificant and negative contributions of the stock market to banking development may have been due to de-industrialisation; with firms operating under capacity in the middle of weakening domestic demand and intensified competition from imports (RBZ, 2014). The results are consistent with the findings of Pradhan et al. (2014), Cheng (2012) and Lucas ((1988). Craigwell et al (2011), however, found causality running in both directions. The empirical findings from the present study thus suggest that, a bank- based system for Zimbabwe is ideal in light of the negative contribution of the stock market to financial development in the long run. With high levels of economic growth, it would be expected that both stock markets and banks requires to be equally promoted in order to achieve successive growth in the Zimbabwean economy.

6.5 RECOMMENDATIONS BASED ON THE FINDINGS

Based on the empirical findings of this study, the researcher recommends that the Zimbabwean financial sector be developed through financial liberalisation so as to enhance economic growth (Ishioro, 2013). Zimbabwe could foster growth by implementing short-run and long-run monetary

policies that will liberalise and promote the optimal functioning of the financial system and equity markets, allowing them to mobilise more financial resources. Such policies should include the promotion of business initiatives while at the same time improving the efficiency and competitiveness of the financial industry in regional and international markets.

Additional policy implications that can be drawn are centered on the short-run empirical results that economic growth causes financial development: therefore, restructuring the economy in order to boost growth is important. Zimbabwe is still in the transitions phase and requires restructuring through improving security of transaction, regulations, transparency and shareholders wealth maximisation. Shareholders needs to be more effective when executing their functions in order to make a positive impact on savings accumulation and technological advancement since these are the main blueprints which potentially drives long term economic growth in Zimbabwe (Ndlovu, 2013).

The positive long term impact of financial development on economic growth provides evidence supporting the finance-led growth hypothesis and the important role that banks can play in the economy. There is therefore a need to create modern financial institutions, improve access to financial products and ensuring financial inclusion as the economy grows. According to the Reserve bank of Zimbabwe (2015) a large unbanked underground and rural economy prevails in Zimbabwe with more than US3billion dollars circulating in the informal sector. As such, it is important for monetary authorities to formulate policies to harness and channel these resources towards productive use. This would foster banking sector and stock market development and, in the process, enhances economic growth.

In order to ensure that corresponding development is achieved in the banking sector and the stock markets monetary policies should geared at ensuring that investor confidence in the financial sector continues to grow. This confidence has been lost in the last decade of financial crisis, which saw a number of banks facing closure while others were faced with a liquidity crisis and numerous other financial distresses (RBZ, 2016). In addition capitalisation of the central bank is required if it is to play its role as a lender of last resort, and strengthen corporate governance measures to avoid potential bank failures. Capitalisation of the banks enhances the credit expansion to the private sector (ZIMSTATS, 2012). This requires the ongoing imparting of financial education to

the business community on the need to invest such advances in productive ventures, however. These ventures will influence rapid economic growth in the long run, which in turn will yield positive development in the financial sector by empowering relevant institutions.

As postulated by Prasad and Rajan (2008) a successful implementation of financial policy depends on the level of institutional and economic development before the policy is implemented. Faria and Mauro (2004) pointed out that in order to achieve rapid economic growth and prosperity, implementable monetary policies should be enacted in an attempt to diversify their exports and improve the productivity of resources by partly or wholly processing exports. This implies that in a country such as Zimbabwe, authorities should include manufacturing as part of the diversification drive in an effort to boost the competitiveness of export commodities. This would lead to higher export revenue which would filter into the non-export sector too, thus increasing the productivity of labour while avoiding the effects of growth retardation. Furthermore, monetary authorities should increase their expenditure while implementing appropriate policies towards economic development. With a mounting number of unemployed in Zimbabwe, this would go a long way in alleviating some of the complications in the short-term in order to prevent social upheaval in the long-term.

The main policy implication of this study's findings is that financial development is better promoted through bank-based economic systems than market-based economic systems. Nevertheless, the monetary authorities should not underestimate the contributions and roles of the stock market in engendering financial development. The negative second lag relationship between stock market and banking sector provides an indication of the need to put measures in place that will force companies to seek expansion through organic growth, as this would boost trading volumes at the stock exchange and further develop the financial sector. In addition corporate control, governance and the regulatory environment must be improved in an effort to foster a more organised trading environment as higher levels of economic growth are achieved.

The government should ensure that an enabling yet stringent regulatory environment, which curbs speculation, prevails at the local bourse. A need further arises for the opening up of an alternative stock exchange intended to meet the listing needs of small businesses while catering for small investors too. A secondary exchange for derivative markets is also needed to complement the

services of the one and only stock exchange in Zimbabwe (Ndlovu, 2013). Jecheche (2010) believes that these exchanges, combined with dual listing, should also be promoted to increase integration with the world financial market.

On the other hand, Frankel (2010) has argued that reforms or liberalisation of the stock markets alone cannot induce economic growth. The empirical findings from this study suggested that it was the combination of optimally performing stock markets, increased private investment, government expenditures and foreign direct investment into the real economy, rather than commerce that would induce economic growth. Furthermore policy makers should ensure that stock markets, where they exist, are developed in such a way that they are incorporated into the financial sector and the economy as a whole. The present study indicates that the degree of integration of the stock markets into the Zimbabwean economy is weak. As illustrated by Adjasi and Biekpe (2006), the efficiency and positive contributions of the stock market to financial development are significant and strong when stock markets are liquid and active. In this case, the general lack of investor confidence and speculations may have had a negative effect on the relationship between stock market, banking sector and economic growth. The monetary authorities should thus relax the listing requirements on the stock market so as to foster fair, efficient and effective trading.

With the rapid promotion of stock markets, the choice should not be either banks or markets but both: both provide complementary financial services that have positive implications for the economy. This view is supported by Abu-Mhareb (2011), who suggests that establishing a legal environment that strongly protects the rights of investors is much more important than comparing the two systems. The present study thus adopts the complementary view and recommends that as the economy grows, monetary authorities should implement policies to promote both banks and stock markets in Zimbabwe.

6.6 LIMITATIONS OF THE STUDY

This study did not cover all institutions that make up the financial sector; it focused only on banking sector and stock market development and their impact on the Zimbabwean economic growth rate. The usefulness of research findings in ascertaining the causal relationship between banking sector, stock market and economic growth is thus limited to the Zimbabwean economy an

can only be generalized to developing economies with similar characteristics and financial market dynamics. Time constraints posed limitations on this study. The limited size of the time series dataset used may have affected the reliability and validity of results in this research. The study was also susceptible to the problem of unreliability of data obtained from secondary sources since such data are often manipulated to suite political agendas. While every care was taken to maintain accuracy in manipulating the data, the possibility of errors and omissions cannot be completely overlooked. It has been noted also that financial development proxies in this study could have been biased for a variety of reasons, among them measurement error, reverse causation, endogeneity and omitted variable bias. Therefore, in any future studies a suitable estimation method should be used in order to obtain unbiased, consistent and efficient estimates of coefficients.

6.7 SUGGESTIONS FOR FURTHER RESEARCH

The majority of policy measures aimed at financial systems implicitly presume that the monetary authorities endeavors to achieve the common good; such an approach, however, neglects the incentives with which policy makers are faced and the political structures within which they operate. The recent Zimbabwean banking crisis provides additional evidence that further research should pay more attention to the complex interplay between government and banks, especially in circumstances where government and financial markets have failed to allocate resources efficiently in the economy.

Consequently, the main suggestion stemming from this study is that future researchers should take a closer look at the relationship between government agendas and banks, especially from the perspective of the political economy, in order to discover possible hidden or embedded factors that have been left out of the finance-growth empirics. Banks do not operate in a vacuum or a neutral environment. They co-exist with other participants in the economy and the larger financial and social system, in which government has a vital role and which is prone to numerous economic and political influences. Further research work should utilize a more prolonged data-set to ascertain the true relationship between financial development and economic growth in Zimbabwe. In addition, panel data analysis should be used in future researches instead of time series analysis in order to allow results generalization to other countries falling in the same predicament as Zimbabwe.

In an attempt to deal with bias emanating from measurement errors, reverse causations, endogeneity and omitted variables further research work should make use of the dynamic General Method of Moments (GMM) estimation model with lagged values of the explanatory endogenous variables as instruments (Beck et al., 2000; Rioja and Valev, 2004). Such methods have several advantages over cross-sectional instrumental variable regressions. In particular, they control for endogeneity and measurement error not only of the financial development variables, but also of other explanatory variables. In the case of cross-section regressions, the lagged dependent variables are correlated with the error term but that is only if the variables are not instrumented (Beck, 2008). In addition, the GMM estimators and panel data analytical techniques includes the lagged error-correction terms, so that the long-run information lost through differencing can be reintroduced in a statistically acceptable way.

Finally the findings from the econometric analysis in this study indicated that in Zimbabwe, during the time period in question, the relationship between stock market development and economic growth was negative. This result refutes the theoretical expectation that, there would be a positive relation between stock market and economic growth. As explained in the analysis, there appeared to be threshold effects, which may have led to multiple equilibria in the long run between finance and growth. The interaction between financial and real sectors may thus have generated two stable equilibria in Zimbabwe, runs counter to most recent empirical and theoretical views of developing economies. For this reason, future investigations of financial development and growth are strongly recommended. More variables that cover all elements of the financial sector, while confirming the robustness of results are necessary for future research to validate and exploit policy implications.

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