DOES TRADE CREDIT FACILITATE ACCESS TO BANK FINANCE? EMPIRICAL EVIDENCE FROM SOUTH AFRICA

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MULALO MADULA

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Name: Miss M Madula

Student number: 5084-940-9

Degree: Mcom in Economics

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I declare that the above dissertation 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.

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SIGNATURE DATE

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ABSTRACT

The earlier theories considered trade credit as a substitute for bank credit. Recent theories suggest that bank credit and trade credit can also be considered as two complementary sources of financing. By using South African panel data from 2007 to 2015, the study examines if the problem of financial inclusion in South Africa can be mitigated by utilising trade credit data. The empirical findings using trade credit at current period are consistent with the earlier theories of trade credit that trade credit and bank credit are substitutes, but the model was not robust to estimation techniques. The study also used the lagged trade credit as a variable of interest and found that it is positively related to bank credit. This means that the trade credit data from the previous period can facilitate access to bank credit. Therefore, the information from trade credit can serve as a signal about firms' quality and thus facilitates access to bank finance.

Key Terms: Bank credit/finance, Collateral, Complementary, Credit Bureau, Financially constrained, Financial Sector, Information, Reputation, Substitute, and Trade Credit

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ACRONYMS AND ABBREVIATIONS

ATM	-	Automated Teller Machine
BASA	-	Banking Association of South Africa
BVB	-	Bureau Van Dijk
CBA	-	Credit Bureau Association
CBA	-	Credit Bureau Association
FSB	-	Financial Service Board
GDP	-	Gross Domestic Product
GMM	-	Generalised Method of Moment
IMF	-	International Monetary Fund
NCA	-	National Credit Act
NDP	-	National Development Plan
SARB	-	South Africa Reserve Bank

CHAPTER ONE

INTRODUCTION

1.0. Introduction

The South African financial services industry experienced significant adjustments, restructurings, regulatory, and technological changes (Basel ii and formation of a National Credit Register and the requirements on reckless lending in South Africa in 2005). These have consequently reduced access to and extension of credit to the economy and changed the structure of credit portfolios that banks hold. Compared to established enterprises that can access equity finance and issue bonds, financially constrained enterprises are significantly affected by these changes as they depend more on the financial institutions for external finance. Banks are widely recognised as the main role players in supplying enterprises with external financing. However, the issue of creditworthiness is still a problem pertaining to access to bank credit. Creditors usually measure the creditworthiness based on ability and willingness to repay a loan. Owing to information asymmetries, not all information necessary to assess creditworthiness is available, resulting in a denial of credit/loan.

An alternative for financially constrained enterprises is trade credit. Trade credit financing has become and to some, it is becoming a common phenomenon in both developing and developed economies. Trade credit is a practice of delaying payments when purchasing goods and services or simply credit purchase (Cuñat and Garcia-Appendini, 2012). Contrary to trade credit providing an alternative finance, financial institutions may use the trade credit data to extend credit to financially constrained enterprises. Hence, the aim of the study is to determine the extent to which trade credit can facilitate access to bank credit.

It is, therefore, possible for the suppliers to lend when banks cannot. This suggests that

bank credit and trade credit may be used as two substitutable sources of finance. Nonetheless, the use of trade credit data can lessen the credit constraint due to imperfect information and credit rationing (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). Thus, the use of trade credit may act as an indicator or signal of creditworthiness by revealing supplier's information to the bank, serving as a complementary to bank credit.

There is also another way trade credit can serve as a complementary to bank credit. This is called the redistribution hypothesis that comes from the imperfect financial markets view of trade credit. This is based on a supposition that financially sound enterprises may redistribute credit to financially constrained enterprises in the form of trade credit. This hypothesis was supported by studies done by Petersen and Rajan (1997) and Nilsen (2002).

1.1. Background to the study

South Africa has a sophisticated financial system, which according to the National Treasury (2011) is sound and successfully weathered the financial crisis in 2008. The financial sector regulatory framework is up to date and effective. Hence, the banks and insurance companies enjoy healthy capitalisation levels, profitability, and investment reserves in South Africa (International Monetary Fund (IMF), 2008). The proportion of the population with access to bank accounts has increased significantly from 46% in 2005 to 75% in 2013 (Finscope, 2013). Although there has been some progress in financial inclusion, according to the IMF (2008), expanding access to reliable and affordable services remains a challenge. As identified by the IMF, the key concern areas are access to bank accounts, lending to small and medium enterprises (SMEs), savings, and insurance products (IMF, 2008).

According to Turner, Varghese, and Walker (2008), South Africa's' lending practices and the level of development of the financial services industry compare to that of the developed economies. However, credit access for South African enterprises is a "tale of two economies", where the formal sector has in comparison to the informal economy

easy access to credit (Turner, et al. 2008). The very large informal sector lacks such access to credit (Turner, et al. 2008). The estimated range of the informal economy is varied, but most estimates are between 7% and 12% of the gross domestic product (GDP)**.**

A survey on small business suggested that the reasons for limited access to credit for financially constrained firms include lack of documentation, fixed income, financial records, customer uncertainty, and forecasting limitations (FinScope, 2006 in Turner et al. (2008)). Therefore, Turner et al. (2008) suggested that information solutions could help bridge the gap between informal and formal sectors and ease the conversion of the informal sector to the formal sector.

On the other hand, access to credit plays a major role in economic growth. Policy makers have also acknowledged this nexus, for instance, The National Treasury (2011:1) stated:

> *The financial services sector touches the life of every South African. It enables economic growth, job creation, the building of vital infrastructure and sustainable development for South Africa and her people. It is, therefore, crucial that the sector is well regulated and stable. However, stability is not the only policy objective for the financial sector. The sector is characterised by high and opaque fees and needs to be more transparent, competitive and cost-effective. Moreover, many South Africans do not have access to financial services. Not only does this inhibit economic growth, but it also keeps people trapped in poverty.*

This suggests that the inability of businesses to access adequate finance to start-up or grow is of concern to policy makers. New businesses can be financed from owners' equity or by accessing external sources of finance whether formally from banks, venture capital companies, and private equity firms or informally from sources such as family and friends. Once a business is operating, it can be financed through retained earnings for further development. However, access to finance is a major problem experienced by South African entrepreneurs, and it ranks second as a factor for small new enterprise creation and high failure rate (Olawale and Garwe, 2010).

Nevertheless, the two introduced sections of the National Credit Act in 2005 (formation

of a National Credit Register and the requirements on reckless lending) may have significant consequences on credit access. The reckless lending provisions necessitate lenders to make assessments to avoid giving loans to applicants who will become over-indebted because of the loan. The NCA also stipulates that lenders use available information to conduct assessments to avoid giving loans that will push the borrower into over-indebtedness (Goodwin-Groen, 2006).

Moreover, the competence to use information analytics is at an advanced level in South Africa and banks have the skills to use the information (Turner et al., 2008). The major South African banks use credit-scoring technology and have used such credit scores for a long period (Turner et al., 2008). Credit bureaus such as KreditInform and TransUnion market many business credit scores, and they rely on both private and commercial information. However, this is restricted to the first economy, yet many enterprises in the formal sector are unable to get access to business credit. According to Turner et al. (2008), South Africa needs to develop varieties of consumer payment information that the credit bureaus collect and enhance the reporting of trade credit information to credit bureaus (Turner et al., 2008). This can stimulate lending by large financial institutions. Nonetheless, the analyses of access to finance in South Africa seldom take into account the use of trade credit (Turner et al., 2008).

In South Africa, the total credit provided to the economy has risen since 1994. Bank credit extended to the private sector as a percentage of GDP has since 1996 risen above 100%. Despite this growth of bank credit extended to the private sector, evidence indicates that South African enterprises are significantly dependent on trade credit. During 2007–2015, trade credit financed approximately 10% of the total assets of the sample enterprises; trade credit contributed 38% of total current liabilities and financed 29% of current assets of the sample firm used in this study[1]. This is an indication that trade credit should not be ignored. According to the literature (Schwartz 1974); Petersen and Rajan, (1997); Fisman and Love, (2003), enterprises use trade credit to deal with financial constraints and to curb lack of finance from financial institutions.

[1] Data obtained from Bureau Van Dijk (Orbis)

1.2. Problem statement

Economic growth in South Africa has slowed significantly since 2011 and forecasts suggest growth would be less than 1 percent in 2016[2]. Schumpeter (1934) argues the importance of new firm creation by saying that 'new firms are the vital force behind the progress of capitalism'. New firms have high potential to provide and develop new products and technologies. "As an important source of innovation, new firms bring competitive pressure to bear on established firms".

New firms are considered as an important element to solve South Africa's development issues. As already stated, in South Africa, access to finance is relatively relaxed for formal sector while the informal sector lacks such access. Underhill Corporate Solutions (2011) analysed the SMEs financing gap in South Africa, where a "financing gap" refers to a sizable proportion of economically significant SMEs that cannot obtain credit. They estimated the total financing gap at around 45-48% of all SMEs in South Africa.

Based on a survey, Finmark Trust (2006) acknowledged that of the application for bank funding only 2% of new firms in South Africa receive funding. Foxcroft et al. (2002) study identified that 75% of new firms' applications for bank credit in South Africa are rejected. Hence, lack of financial support for businesses is one of the factors for new firms' failure. Thus, it suggests that lack of access to finance for new firms may impede survival and growth.

Financial intermediaries mobilise excess funds from those with a surplus of capital to those with a shortage of funds and have projects that yield returns, the projects of which impact on productivity. To allocate financial resources efficiently, the financial sector needs to be well developed. This entails the ability to effectively get the information required, good regulations and accounting standard, provision of services at reasonable cost and the ability to pool risk across investment project in order to provide adequate investor return (Eichengreen, Gullapalli, and Panizza, 2009).

[2] See https://www.resbank.co.za/Lists/News%20and%20Publications/Attachments/7278/FSR%20First%20edition%202016.pdf Accessed 20 June 2016

However, automated underwriting has become more common. Hence, lenders are increasingly relying on the standardised data when providing credit. There is a default assumption in automated underwriting that insufficient information is equivalent to higher credit risk. This is why most lenders have a view that many South African entrepreneurs, especially in the informal sector, are high credit risk due to insufficient credit information (Turner et al., 2008). According to Turner et al. (2008), South Africa can move the well-established credit infrastructure to smaller but vital businesses by putting needed data in the credit bureaus.

The literature on business finance in Africa usually focuses on bank credit. However, banks are not the only major sources of external finance that African firms have access to; trade credit also plays a role. The importance of trade credit is visible among new firms because trade credit is viewed as the first resort for entrepreneurs and constitutes an important element of a healthy economy (Staley and Morse, 1965). This is notable because, unlike bank credit, any formal collateral is not needed for trade credit. To develop an environment conducive for enterprises to thrive in, the government has to level the playing field. Therefore, if trade credit facilitates access to bank credit, then it raises some considerations attached to legal, regulatory, and policy reforms designed to promote trade credit information sharing and development. The importance of studying trade credit is elaborated under the significance for the study section.

1.3. Aim and objectives of the study

Economic growth is a complex phenomenon, which is determined by many complex structures. As the problem statement of the study indicated, it is argued that access to credit is essential for an economy to appeal to investors and enhance economic growth. The main aim of this research is to examine if trade credit can facilitate access to bank finance in South Africa. The study determines the objective by:

- Analysing the lending condition in South Africa.
- Identifying whether there is a correlation between selected measures of bank credit and trade credit in South Africa.

- Analysing and evaluating whether trade credit plays a signalling role for banks.
- Based on the findings, propose policy measures that can improve information sharing and access to credit by enterprises.

1.4. Significance/rationale for the study

Any enterprise needs access to finance to start trading and to fund growth. Lack of such access to credit can constrain the business growth (Cassar, 2004). Furthermore, Rajan and Zingales (1998) suggest that firms in countries with poorly developed financial institutions are forced to rely more on funds generated internally. The incompatibility of financial products currently on offer in the South African economy makes it difficult for enterprises to flourish and hence promote economic growth and achieve the objectives of the National Development Plan (NDP). Surveys that have been undertaken in South Africa provide reasons for limited access to credit. These include but not limited to lack of documentation, fixed income, financial records, and customer uncertainty and forecasting limitations (FinScope, 2006 in Turner et al. (2008)).

This suggests that barriers to credit access emanate from information gaps. According to Turner et al. (2008), this gives the suggestion that effort to address information gaps may lead to broader lending, particularly for informal economy. The National Credit Regulator is considering this option in order to make trade credit information to be reported to the credit bureaus. According to Turner et al. (2008), this could help broaden access to financial credit for financially constrained firms in South Africa. The study intends to examine if the information from trade credit can facilitate bank credit.

There is no empirical study yet to identify whether the information from trade credit can facilitate access to bank credit in South Africa. Among trade credit studies that have been carried out in South Africa, Kwenda and Holden (2014) is marginally closer to the objective of this study. Kwenda and Holden (2014) dealt with determinants of trade credit among South African listed firms. Otto (2014) dealt with the management of trade credit in SMEs while Kohler and Saville (2011) dealt with the determinants of access to trade credit by new SMEs in the Eastern Cape Province of South Africa. Olawale and Akinwumi (2010) focused on trade finance. The current study is the first to analyse if

trade credit data facilitate access to bank credit in South Africa. This will assist policy makers to determine if it is necessary to consider including the trade credit data in the credit bureaus. If trade credit significantly facilitates access to credit, it will influence the policy makers and credit bureaus to include trade credit data on their system, which in essence will provide more information about financially constrained enterprises and reduce their credit constraints. Increasing access to finance will enable enterprises to flourish and hence promote economic growth and achieve the objectives of the NDP.

1.5. Outline of chapters

The study is organised as follows: the first chapter introduced the study by determining the problem statement, aim and objectives of the study and the significance of the study. The second Chapter presents the literature review. Chapter 3 provides an overview of the South African financial sector and trade credit developments. Chapter 4 describes the econometric method, data sources, and variable selection. Chapter 5 discusses the results and, Chapter 6 concludes the study, formulate policy recommendations and suggest areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

The development of the financial sector is important in stimulating economic growth. The financial sector contributes significantly to economic growth, among others, through the vast roles, such as allocating capital, savings mobilisation, technological changes promotion, and enabling the exchange of goods and services. Owing to market imperfections, the financial sector may not be able to provide its services to everyone. Specifically, owing to information asymmetry, some enterprises are financially constrained and are unable to receive funding from banks.

To alleviate funding problems, enterprises may try to raise funds from other non-financial creditors, namely, the suppliers. Whenever a payment for goods and services does not occur concurrently when the goods and services are delivered, the supplier is ultimately extending a short-term credit to its customer. This is an important source of short-term funding for most enterprises and it is called trade credit. The foundation of the trade credit theory was first proposed by Meltzer (1960) dating back from the 1960s. There is an extensive literature focusing on trade credit as a source of finance. Most of the literature focuses on periods of tight/contractionary monetary policy with a focus on the developed financial markets, most particularly the United Kingdom (UK) and the United States (US). Trade credit is give-and-take in nature, such that it represents an element of both liabilities and assets (Alatalo, 2010). For instance, most firms can obtain trade credit from their suppliers and extend trade credit to their customers.

It is however not obvious why firms provide trade credit to their customers while there are many financial institutions specialised in providing finance. There are many theories that interrogate and describe this phenomenon. The theories of trade credit can be divided into two different categories and can fall in either or both demand and supply side theories of trade credit.

Firstly, several researchers have acknowledged transaction motives for using trade credit. Transaction motives state that trade credit can enable less frequent payments, thereby reducing transaction costs (Ferris, 1981). Trade credit could be utilised to gain a means to price discriminate between different customers (Brennan, Maksimovic, and Zechner, 1988; Petersen and Rajan, 1997). Another motive for trade credit is reducing informational asymmetries (Long, Ravid, and Malitz, 1993; Smith, 1987); and preserving the equity stake in the customer (Smith, 1987; Petersen and Rajan, 1997). These motives are elaborated in section 2.4.

The other group of theories falls under the financing motive of trade credit. This group of theories emphasises motives that may give the supplier a financing advantage compared to other financial intermediaries in providing credit to the customer. The financing motives range from the suppliers greater advantage in monitoring their customers, (Mian and Smith, 1992; Jain, 2001), ability of suppliers to control the customers (Petersen and Rajan, 1997; Cuñat, 2007), and higher recouping value of the collateral (Mian and Smith, 1992; Frank and Maksimovic, 2004).

The financing motive suggests that the decision to use trade credit may differ depending on the accessibility of other sources of funding. This has formed the basis of the trade credit theory, which suggests that during the contractionary monetary policy period, enterprises increase their trade credit accounts (Kohler, Britton, and Yates, 2000; Nilsen, 2002; Mateut, Bougheas, and Mizen, 2006). This entails that trade credit can be used as a substitute for other sources of financing. The theory also postulates that firms that are financially strong and less susceptible to a reduction in money supply redistribute funds to the financially constrained firms in a form of trade credit (Nilsen, 2002).

On the other hand, as a financing motive, the use of trade credit can alleviate the credit constraint that firms may have due to imperfect information and credit rationing. Thus, the trade credit information can be used as a signal to the banks by revealing the suppliers' information to the bank (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). For instance, Tateka and Udell (2007) find some evidence of trade credit and bank

credit acting as complements rather than a substitute.

This chapter first examines trade credit theories to emphasise the importance of trade credit and its financial intermediary role. This also describes the aspect influencing trade credit use and the motives and factors of using trade credit. Finally, the last section analyses the empirical evidence and more specifically the relationship between bank credit and trade credit discussed in previous research.

2.1. Overview of lending condition

The financial intermediaries including trade credit suppliers contribute significantly to economic growth, among others, through the many roles, such as capital allocation, mobilising savings, promoting technological changes, and enabling the exchange of goods and services. According to Sirri and Tufano (1995), lack of access to multiple investors may induce the production processes to be constrained to economically inefficient scales. This is exacerbated by the 'market of lemon' dilemma described by Akerlof (1970) where quality and uncertainty are related in the automobile market (investor may not be willing to lend their fund where there is quality uncertainty). Therefore, mobilising savings is one of the essential functions of financial intermediaries. The process of mobilising savings comprises of accumulation of capital from a group of different savers for investment. This consists of having to overcome the transaction costs that are linked with an assortment of savings from different individuals. Financial intermediaries also need to overcome asymmetries of informational linked to making savers comfortable with giving control of their savings. Inability to overcome information asymmetries requires enterprises to find alternative funding mechanisms.

Financial intermediation is also important because it is cumbersome and costly for individual savers to assess the true intention of firms' managers and different conditions in the market. In most cases, individuals lack the time and capacity to gather and process information on many groups of enterprises, managers and economic conditions (Djoumessi, 2009). On the other hand, it is possible for borrowers to have more information than lenders regarding their projects. Consequently, this can cause

information problem, which may create the problems of adverse selection and moral hazards. Moreover, savers may be hesitant to invest their money in the project in which they have inadequate information. This may discourage savers from investing, hence, precluding capital from flowing into its optimal use.

However, financial institutions are able to monitor borrowers after providing funding. Financial institutions do so to make sure that borrowers use the finances for their intended use. Without the monitoring, managers may stray from the initial objectives of the enterprise, and this may cause the business to fail. According to Stiglitz and Weiss (1981), the lack of financial agreements used to enhance the corporate control may hamper the savings mobilisation, thereby preventing capital from flowing to profitable investments.

Financial intermediaries also support individuals to buy now and pay at a later stage. This enhances efficiency in the economy and expands the production technologies available to the economy. According to Li (2011), well-developed financial institutions enable better allocation of financial resources to fund projects that have the highest returns. Rajan and Zingales (1998) focused on the allocative role of trade credit, and they identified that firms with a substantial need for external finance can only develop at a faster rate in well-developed financial markets. According to Rajan and Zingales (1997), this can then implore the question whether firms with projects that would yield a high return in poor developed financial markets can take steps to alleviate the effects of poor financial markets. Rajan and Zingales (1997) then state that firms are required to rely more on funds generated internally or trade credit. In most cases, these challenges stem from information asymmetry and lack of collateral.

Collateral can play an important role in curbing the challenges of acquiring credit. The main principle of collateral lies in granting the first preference to a creditor in recovering credit through some property belonging to the debtor in case of default. This is done by necessitating that the creditor has a secured interest. In the event of default, collateral provides the creditor with a secured interest priority over the general claims of

unsecured creditors to sell the item to recover the loan. In a collateralised system, creditors must have the legal right to take possession of the assets over which the debtors have ownership rights.

In most cases, the credit constraints faced by borrowers with a demand for bank credit is largely based on information asymmetry. According to Stiglitz and Weiss (1981), credit rationing can be an outcome in light of adverse selection and moral hazard. As such, firms with profitable projects or investment opportunities are unable to pursue them because credit providers cannot verify the quality of the project, or face a moral hazard problem where it is hard to ensure that funds are not used to finance other riskier projects that were not considered by the supplier of funds. The availability of collateral can deal with the problem of adverse selection and moral hazard because collateral increases the probability that the lender will recover the loan by making default costly (Li, 2011).

Collateral has also been motivated as a means to alleviate information asymmetries. Therefore, collateral and information asymmetries views are highly correlated. The more severe the information asymmetry between the borrower and the bank, the more likely the firm is to default. Therefore, collateral can effectively substitute for information. According to Li (2011), these conditions include that the legal system functions properly, the value of collateral should be adequate, and the collateral value should not erode over time. However, financially constrained and small firms lack adequate assets to pledge as collateral. Hence, bank funding is not simply available to small firms. This inclines them to depend on inside finance. Growth over time may allow access to external private equity and debt and ultimately to public equity and debt markets. This suggests that a small firm's probability of securing an external debt contract is positively related to the value of assets that it can pledge as collateral (Li, 2011).

Nevertheless, according to Li (2011), the need for collateralised lending can be reduced by improving the information available to lenders. In order to evaluate the customers' creditworthiness and possible default risk, both suppliers and banks need information.

Suppliers compared to banks have better and cheaper channels they can use to obtain information of customers. Hence, according to Jain (2001), trade creditors can play a role by being the second layer between banks and borrowers. Therefore, banks may choose to lend money to suppliers instead of customers to avoid high evaluation costs in an industry with many customers. Frank and Maksimovic (2004) specified that the redistributive role that acts as a second layer is helpful. The second layer enables suppliers and customers to diminish the need for external finance. This is more evidence if the financial market is inefficient and the market where suppliers have more power.

Furthermore, financially constrained enterprises may use trade credit as a substitute. Schwartz (1974) emphasises that the impact of monetary control is alleviated by trade credit. This entails that during the monetary constraint period, firms that have access to other financing institutions may have the will to offer trade credit to customers. If the bank interest is higher than trade credit costs, customers would be more likely to use trade credit. Nevertheless, it is possible for suppliers to have information advantages over banks. This possibility exists to suppliers because they can assess a firm's financial performance, repossess, and resell goods in case of default. Therefore, trade credit can also be considered as a technique to alleviate information asymmetry, because trade credit information if used can signal firms' creditworthiness to banks. Extensive studies have been done during the past four decades to determine the theories of trade credit. According to a survey by the IMF (2009), approximately 60% of the international trade transactions are financed through trade credits. The literature on trade credits provides numerous justifications why firms rely on trade credit financing.

2.2. What is trade credit

Trade credit is give-and-take in nature such that it represents a substantial element of both assets and liabilities (Alatalo, 2010). Firms can obtain trade credit from their suppliers and extend trade credit to their customers. On the books, obtaining credit from suppliers is called accounts payable, creditors, or trade payables. Extending trade credit to the customer is called accounts receivable, debtor or trade receivables.

2.2.1. Accounts Payable

Usually, the literature refers to accounts payable as trade credit. Trade credit transactions generally comprise short-term deferred payment of purchases of goods or services. Through the deferral of payment, trade creditors are effectively funding their customers with short-term debt and can be called credit purchases. Cash is only paid on maturity of the accounts payable. From the firm point of view, accounts payable represent liabilities because of the credit purchases of goods or services that will need to be repaid later.

Compared to other creditors or corporate debt, trade credit has three main differences:

- Suppliers do not lend money, they lend 'in kind';
- Provision of trade credit generally does not require the formal contracts(contrast to bank credit) between the lender and the borrower; and
- Non-financial firms issue trade credit.

2.2.2. Accounts receivable

Accounts receivable is the amount owed by the customers for good or services sold to the customers on credit instead of cash, allowing customers to pay later than the time of purchase. Cash from credit sales or accounts receivable is only generated on the maturity of the accounts receivable and that the sale of goods or services on credit converts an enterprise's finished goods into accounts receivable (Otto, 2014). From the enterprise's point of view, accounts receivable denote liquid assets because of the credit sale of goods or services (Barad, 2010). The total value of accounts receivable is allocated on the asset side of the enterprise's balance sheet.

Accounts receivable is, in most cases, a significant portion of current assets. A number of factors determine the size of accounts receivable. In most cases, these factors may differ from an enterprise to enterprise, and differ according to the nature of the industry (García-Teruel and Martinez-Solano, 2010). The factor can range from the seasonal nature of sales and specific seasons for the enterprise etc. The reason for providing

credit sales is to expand sales, which may increase the profit levels and ultimately increase the liquidity of the enterprise.

A firm that sustains a high proportion of account receivable to cash sale is considered to have a high level of investment in account receivable if it is dealing with a high sales volume. In instances where most of the customers are considered creditworthy and financially stable, the firm can operate with less invested in accounts receivable because all payments are received within a short period of time (Otto, 2014).

When providing credit sales, firms need credit policy. An enterprise with a lenient credit policy has comparatively larger accounts receivable than an enterprise with a more rigid credit policy. This is mainly because a lenient credit policy may lead to high default rate by financially weak, which may result in a high volume of accounts receivable. To encourage early payments, debtors are offered cash discounts. A cash discount provides an incentive to persuade early payment/payment within the stipulated period or before the end of the credit period. Cash discount is an offer to pay less if the customer pays within the period agreed upon (Otto, 2014).

2.3. The use of trade credit

According to Li (2011), the aspect that influences trade credit usage includes the relationship between suppliers and customers, the relationship between customers and banks and other financing institutions, monetary policy and savings in monitoring customer costs for banks. Suppliers are critical players in trade credit financing (Burkart and Ellingsen, 2004). Petersen and Rajan (1994) supported this view and emphasised the importance of relationships between suppliers and customers on the level of the trade credit. Reason being that, the relationship between suppliers and customers allows the suppliers to monitor the customer behaviour. To support the notion, Nilsen (2002) also argues that trade credit transpires during the sale of goods and services between suppliers and customers.

Nilsen (2002) argues that trade credit use is linked to the monetary policy. Following to this view, trade credit is considered a substitute for bank credit even though it might not

be the optimal choice (Nilsen, 2002). This view supports that small firms resort to trade credit during the tight monetary policy period. Nilsen (2002) predicted that in contrast to small firms, large firms with more credit channels tend to avoid trade credit.

2.4. Motives of trade credit

Trade credit theories can be divided into two categories, namely; the transaction motives and financing motives. Transaction motives can range from reducing transaction cost by making payments less frequently, gaining a mean to price discriminate, reducing informational asymmetries, and preserving the equity stake in the customer. The second group of theories falls under the financing motives for the use of trade credit. The financing motives range from the suppliers greater advantage in monitoring customers, the ability to control the customer, and higher recouping value of the collateral.

The financing motive also suggests that firms' decision to use trade credit depend on the availability of other sources of finance. This hypothesis laid the ground for the trade credit theory, which proposes that trade credit may substitute traditional sources of finance. Contrary to that, trade credit can act as a complement rather than a substitute to bank credit.

2.4.1. Transactions motive

According to Ferris (1981), the supply of both goods and finance combined from one source can lead to cost advantages and a reduction in transaction costs. The customer does not have to bear the transaction cost of buying good and getting funding separately. This can, in turn, improve the cash flow forecast and simplify the management of cash. In addition, transaction costs can be reduced if provisions of all goods and services are accumulated and paid for at the same time. Furthermore, the unpredictability because of fluctuations in daily sales can be reduced through enterprises offering trade credit or credit sales. Based on the terms offered, suppliers are in a better position to know the date in which customers are likely to settle their accounts. The better knowledge that supplier gain from customer behaviour may lead to

better forecasts that ease the necessity for firms to keep large amounts of cash, and this can subsequently reduce the cost of having to hold precautionary cash balances.

2.4.1.1. Price discrimination

Trade credit may be offered in a situation where the supplier does not have a financing advantage over financial institutions because trade credit can be used for price discrimination. The theories such as Meltzer (1960), Brennan et al (1988), and Mian and Smith (1992) supported this. The terms of trade credit generally never change upon the changes to the credit quality of the customer. Hence, trade credit may reduce the effective price that the low-quality borrowers pay.

Price discrimination can lead suppliers to extend credit to their customers (Meltzer, 1960; Petersen and Rajan, 1997). Petersen and Rajan (1997) argue that suppliers normally provide discounts for customers who pay early. Therefore, the prices are different for early payment and late payment (Garcia-Teruel and Martinez-Solano, 2010; Atanasova, 2007; Guariglia and Mateut, 2006). Given that credit terms are uniform for customers with different credit quality, low-quality customers can enjoy an effective reduction in the price of goods and services (Petersen and Rajan, 1994). Low-credit quality firms have comparatively inelastic demand, allowing suppliers to exploit high-profit margins (Petersen and Rajan, 1994). High-quality borrowers consider the price of trade credit as too high, motivating them to make repayments quickly. Contrary to that, risky customers find the cost of trade credit lower than other sources of funding.

2.4.1.2. Advantage in information acquisition

The information hypothesis holds that supplier may visit the customer more often; hence, the size and timing of the customer's orders can give them an idea of the condition of the customer's business. If a customer fails to take advantage of early payment discounts can serve as an alert to the supplier of customers' weakening creditworthiness. Financial intermediaries may be able to collect similar information, but the theory holds that the supplier can get the information quicker and cheaper because suppliers obtained this kind of information in the ordinary course of business (Li, 2011).

Hence, banks are hesitant to be exclusive lenders because they face a “market of lemon” dilemma. However, banks may become convinced to lend if they observe that suppliers extend credit to a particular customer.

Asymmetric information is also evident in the product markets. This implies that there is uncertainty about the quality of goods from suppliers. By offering trade credit, customers are given a period in which they can use to verify the quality of the product before they pay (Smith, 1987). Hence, trade credit can then provide a positive indication of the quality of the product by giving the customer a period to inspect the product through deferred payment.

Ferris (1981) expands on this and argues that the decision to take trade credit depends on the availability and relative prices of alternative finance. As a result of equilibrium, firms may demand trade credit at rates higher than those required by banks and other financial institutions where there is credit-rationing (Stiglitz and Weiss, 1981). Given that credit rationing by banks is a function of risk, high-risk firms are likely to have a higher demand for trade credit.

Moreover, trade credit demands rise because of suppliers’ relaxed collateral requirements compared to banks (Fafchamps, 1997). The most important aspect of trade credit is the relationship between the supplier and the customer as it may provide reliable information that improves the enforcement and monitoring of payments (Petersen and Rajan, 1997). Therefore, it suggests that trade credit depends more on the relationship and is less dependent on formal collateral. To support this supposition, Cunat (2004) has developed a model that indicates that if a firm has a lower level of assets that can be collateralised the demand for trade credit is expected to be higher.

2.4.1.3. Preserving the equity stake in the customer

According to Alatalo (2010), a supplier might not favour riskier customers exclusively to boost sales in the short-term. However, suppliers may also have a long-term interest in the survival of the customer firm to preserve the equity stake in the customer. In this instance, the supplier does not only consider the current sales and profit margin, but

they may also need to take into consideration the present value of the profit margins on future sales to that customer (Alatalo, 2010). This is usually the case if the supplier has few alternative customers or where the supplier has provided a “non-salvageable investment” on the customer (Smith, 1987; Petersen and Rajan, 1997). Suppliers may also provide a lenient liquidation policy for defaulters than banks, which do not hold much implicit equity stake in their borrowers (Huyghebaert, 2006; Huyghebaert, Van de Gucht and Van Hulle, 2001). Thus, firms that value having control rights may limit their bank borrowings and take up more trade credit (Alatalo, 2010). Huyghebaert (2006) argues that when ownership of start-up firms is concentrated in the entrepreneurs’ hands, firms borrow more from their suppliers.

2.4.2. Financing motive

The financing motive of trade credit holds that it is possible for suppliers to have an advantage over banks in examining the creditworthiness of their customers. Suppliers are also more able than banks to monitor and enforce payment of the credit. These may give suppliers a cost advantage over financial institutions. Schwartz (1974) motivates this and Meltzer (1960) proposed that financially constrained firms with limited access to bank credit increase the use of trade credit. In addition, Meltzer (1960) proposed that during the tight monetary policy period for instance in the mid-50s, firms with relatively high cash balances extended the average time for which trade credit was granted, and thus financed businesses that were discriminated with credit constraints by banks. Mateut et al. (2006), incorporated trade credit into a theoretical framework and indicated that trade credit takes its place during tight monetary policy period as bank lending is restricted for financially constrained firms.

One of the oldest views explains trade credit as something that emanates from the imperfections of the financial market. This can be referred to as the financial motive of trade credit and arises due to financial markets imperfections. The imperfection arises from the possibility of some firms having easier access to fund than their customers, which may then encourage them to utilise their capacity to borrow and pass credit to their customers (Schwartz, 1974). Emery (1984) therefore argues that hurdles to bank

credit that experienced by financially constrained firms and the resulting “non-competitive rents” provide suppliers with an opportunity to extend credit.

According to Emery (1984), the imperfect market’s view of trade credit can lead to the argument that banks redistribute credit from financially sound firms to financially constrained firms in the form of trade credit, using suppliers as a middle man. According to Love, Lorenzo, and Virginia (2005), redistribution can occur if some firms (financially sound) can raise external credit that they then pass on to constrained firms.

Demirguc-Kunt and Maskimovic (2001) proposed an argument that is related to the redistribution argument. The complementary view of Demirguc-Kunt and Maskimovic claims countries with large and efficient financial sectors use trade credit substantially. Non-financial financially sound firms act as agents for the financial intermediaries by advancing credit to and borrowing from other firms when they have a comparative advantage in enforcing credit contracts.

The recent theory falling under financing motive of trade credit focuses on information asymmetry. The theory hold that use of trade credit can alleviate the credit constraint that firms may have due to imperfect information and credit rationing. Thus, the trade credit data can be used as a signal to the banks by revealing the supplier's information to the bank (Biais and Gollier, 1997; Burkart and Ellingsen, 2004).

All theories that fall under financing motive of trade credit are due to some advantages that suppliers have over banks. Suppliers have advantages in controlling customer and an advantage in salvaging the value from existing assets.

2.4.2.1. Advantage in controlling the customer

It is possible for the supplier to have an advantage over banks in controlling the customer. This possibility arises if there are few alternatives financial sources other than the particular supplier of the good/service. In this case, the supplier can control the customer in different ways. The supplier can give the customer threat of cutting off the future supplies in the event that the customer shows sign of defaulting on their

repayment. However, financial institutions have limited powers to threaten their borrowers and the threat to withdraw future finance may have little immediate effect on the borrower's operations (Mian and Smith, 1992). Furthermore, the financial institution's ability to withdraw past finance may be constrained by bankruptcy laws (Mian and Smith, 1992).

2.4.2.2. Advantage in salvaging the value from existing assets

The supplier is in a better position to salvage the value of existing assets. If the customer defaults on the payment, the supplier can take the goods supplied. The extent to which the intermediate goods supplied can serve as collateral also affects the willingness of suppliers to extend trade credit (Mian and Smith, 1992; Petersen and Rajan, 1997). The durable the goods supplied, the valuable they are as collateral and hence the more credit the supplier can extend to customers. In addition, the longer the intermediate goods remain in their original state, the more useful they are as collateral to the seller who can repossess them and sell them to another customer. This means that the state and quantity of raw materials held in inventory by customers has an impact on the decision of suppliers to provide trade credit.

Frank and Maskimovic (2004) explain that inputs provide collateral supporting trade credit while finished goods do not. The proportion of the sale that is financed by trade credit increases with the value that can be recovered in the event of repossession. Furthermore, supplier cost of repossessing and reselling the product supplied is lower than that of a financial institution because the supplier has a network for selling its goods, and the goods repossessed are ordinarily in their line of business.

2.5. Factors of trade credit

According to Li (2011), many factors influence trade credit. Some of these factors are linked to the economic development of a country, such as financial systems, legal structures, GDP, market interest rate and monetary policy. These factors are considered to form part of macroeconomic factors. On the other hand, there are firm-specific factors that are controllable by the firm.

2.5.1. Macroeconomic factors

As already mentioned, trade credit is influenced by the development of the financial system; legal structure of the country and monetary policy. SMEs rely on the trade credit during the tight monetary policy periods, as they are prone to experience financial problems during those periods (Li, 2011). Furthermore, also linked to the monetary policy, Niskanen and Niskanen (2006) stated there is a relationship between the market interest rate and trade credit. This is based on the assumption that higher market interest rate increases the probability of trade credit taken as an alternative.

As already stated, the financial system is also a macroeconomic factor of trade credit. In this regards, Demirguc-Kunt and Maksimovic (2001) stated that financial intermediaries could easily monitor borrowers in the well-developed financial market. Firms in the Well-developed financial market can easily receive funding directly from the financial institutions. However, the weak financial market may depend on non-financial institutions because firms lack financial access from other financial institutions.

A well-developed legal infrastructure in a country also contributes as a macroeconomic factor (Demirguc-Kunt and Maksimovic, 2001). If a country has a well-developed legal infrastructure, creditors have strong legal protection against borrowers' default. Such a protection can encourage financial institutions to extend collateral or security backed credit. As such, trade credit can be negatively related to the good legal system.

Contrary to the theories above, Niskanen and Niskanen (2006) justified that trade credit can increase during the period of high macroeconomic development. Their justification leans toward investment opportunities. During high macroeconomic development, investment opportunities tend to rise. Therefore, firms may resort to trade credit to focus their attention on the investment opportunities and support their operations.

2.5.2. Firm-specific factors

Suppliers and their customers decide on the size of trade credit to advance or borrow. Accounts receivable is determined by the ability of the firm to extend credit and the

extent to which they are willing to provide credit to its customers. Account receivable is also dependent on the demand from customers and their willingness to use trade credit. Hence, accounts receivable is dependent on a couple of firm characteristics, which can be called the determinants of trade credit. Among many, this includes firm's creditworthiness, ability to obtain financial debt and the cost of financial debt relating to sales growth and gross profit margin.

Firstly, firm's creditworthiness is one of the most important determinants of trade credit discussed in several kinds of literature. Firm's creditworthiness is an indication of a firm's ability to obtain alternative finance and its credit capacity and reputation. Creditworthiness is usually measured by firm age and size (Li, 2011). Hence, many authors demonstrated that large enterprises could achieve trade credit requirements easily (Petersen and Rajan, 1997; Danielson and Scott, 2004). Creditworthiness shares the same interpretation as the ability to obtain financial debt, which measures the capacity of a firm to access external funding.

The third determinant is the cost of financial debt. The higher the financial costs the lesser the incentive to offer trade credit and the more the incentive to resort to trade credit. Therefore, Nilsen (2002) argued that during the period of tight monetary periods, the cost of bank credit might be higher than trade credit. As a result, the level of trade credit can be increased.

The fourth factor is related to sales growth. This element is explained from the accounts receivable point of view. According to Petersen and Rajan (1997), firms needing to achieve high sales growth are high likely to accept trade credit transactions. This entails that there is a positive relationship between sales growth and trade credit. Emery (1984) demonstrated that firms with low sale growth are more likely to grant more trade credit as a marketing tool. Gross profit margin is the last factor of trade credit and its interpretation is similar to sales growth factor. According to Emery (1984), firms with a high gross profit margin attempt to achieve high sales by granting more trade credit.

2.6. Empirical literature review

Having considered the relevant theories underlying the trade credit and bank credit nexus, it is important to review the empirical research that has been conducted on trade credit. In determining whether trade credit plays a role in financial intermediation, many researchers looked at the relationship between different determinants of trade credit and accounts payable and/or accounts receivable. Contrary to that, only a few studies focused on the theories provided by Biais and Gollier (1997) and Burkart and Ellingsen (2004), which argue that trade credit data can be used as a signal to the banks by revealing the supplier's information to the bank. The difficulty in testing theories of trade credit so far has been the lack of data, but based on available data, there have been some interesting findings.

This study provides empirical evidence according the findings or results. For every study listed below, where it is possible the sample period, countries used, the data, dependent variables, independent variables, the econometric model used is discussed, and few remarks are provided. There are different views and empirical research on transaction motive and the financing motive of trade credit. However, the most studied in the economics literature is whether trade credit plays a substitutive or complementary role in financial intermediation. Other researchers view trade credit as a substitute to bank credit, others perceive it as a complementary to bank credit, and on the other hand, others has mixed results. Most of this empirical evidence is based on developed countries, such as UK and US, with only a few based on African countries.

2.6.1. Trade credit and bank credit are substitutes

There are several empirical studies that studied the hypothesis that trade credit becomes a substitute for bank financing in periods where firms experience credit constraints. Among these studies, Petersen and Rajan (1994, 1997) analysed the US small firms using survey data in the late 1980s. The studies used the standard simultaneous equations techniques and find that during the tight monetary policy periods, small firms are likely to be bank credit rationed and they react by opting for

trade credit. These are the most widely cited empirical works on trade credit. They found that firms of higher credit quality receive more credit than firms of low credit quality. In addition, the size and timing of the customer's orders indicate the state of customer's business. Their results also showed that the higher the proportion of raw materials in inventory, the greater the amount of trade credit provided. They also drew the conclusion that suppliers have a financing advantage stemming from suppliers ability to acquire information at low cost and their ability to liquidate their assets efficiently.

Also based in the US, Nilsen (2002) used the quarterly aggregate balance sheet data of US firms to investigate the role of trade credit within the bank lending channel of monetary policy transmission. The study used the Vector Autoregressive Models using accounts payable as the dependent variable and inventory, and liquidity as the independent variable. The study also used accounts receivable as a dependent variable along with macro variables such as; GDP, price level, and the monetary policy indicator (interest spread) as independent variables using time-series regressions. The study found that the time-series regressions for small firms increase trade credit use during monetary contractions and among large firms, only unrated firms increase trade credit use during contractions.

Huyghebaert (2006) examined the theoretical predictions using 328 start-ups' panel data over 1992 to 2002. The study used the pooled ordinary least squares (OLS) and random effects panel estimation. The dependent variable was the ratio of accounts payable to total assets. The independent variables were firm age, firm size (logarithm of total assets), and the start-up's ratio of tangible fixed assets to total assets to serve as collateral for bank credit. The study concluded that start-ups are more likely to use trade credit when there are financially constrained, when suppliers have a financing advantage over banks, when entrepreneurs value private benefits of control and when transaction costs are important.

Guariglia and Mateut (2006) used the UK quoted companies' data from 1980 to 2000

and estimated the error-correction inventory investment equations (because some independent variables reflected the influence of a long-run target inventory level) extended with the coverage ratio and the trade credit to assets ratio. They carried out regression using a first-difference GMM method. Their study differentiated the effects of the variables across firms that are more likely to face financing constraints and firms that are making high or low use of trade credit. To test for offsetting effect of the credit channel, they used an augmented version of the equation. The study concluded that in the UK, trade credit rises during the periods when monetary policy is tight, and bank lending falls.

Atanasova (2007) investigated the information on a panel of limited liability UK firms from 1981 to 2000 and estimated a switching regression model. According to Atanasova (2007), “Endogenous switching allows for possible correlation between the shocks to the demand for trade credit with the shocks to firms’ financial and other characteristics”. The variable used in the study were age, industry, and year dummies, the vector Z, which includes a set of variables that are indicators of financial strength and the vector X, which includes a set of observable firm-specific variables, industry-wide averages, and industry and year dummies. The study concluded that trade credit is a substitute for bank credit when firms are financially constrained.

Also based in the UK, Cuñat (2004) developed a model in which trade credit arises from the commercial and technological links between firms. Based on a sample of UK firms, he found that trade credit increases with firm age. According to Cuñat (2004), trade credit is used once other forms of credit have been fully utilised. He also finds that the share of trade credit relative to other types of finance is significantly affected by collateral. Lower levels of collateral are associated with a higher proportion of trade credit. This is considered to be consistent with the view that firms exhaust other sources of credit before using trade credit.

Using the accounting information for UK manufacturing, retail and wholesale firms over 1993 to 2002, Cuñat (2007) tested the theoretical model that commercial ties between

firms imply that suppliers are better able than banks to enforce non-collateralised debt repayment, and suppliers provide liquidity to customers with temporary difficulties. The study used the individual fixed effects and a GMM method. The dependent variables used were trade credit divided by total assets and trade credit divided by total debt and the independent variables were the age of the firm in days, the annual growth rate of assets, liquid assets, and collateral. The study concluded that the levels of trade credit are higher when firms experience liquidity shocks.

Wilson and Summers (2002) investigated the determinants of trade credit usage for a sample of small UK firms. They concluded that firms with a higher degree of financial risk (proxied by profitability and the debt ratio) have a greater demand for trade credit. Business risk (proxied by firm age) is positively related to trade credit demand and firms with more concentrated ownership use relatively more trade credit.

Tsuruta (2008) and Ogawa, Sterken, and Tokutsu (2011) looked at the Japan market to examine whether trade and bank credits are substitutes. Tsuruta (2008) examined the sample of Japanese SMEs between 1997 and 2001 and performed fixed effects regression. The study used accounts payable-debt ratio and accounts payable-asset ratio as dependent variables. The independent variables consisted of firm characteristic variables (Scale, firm age, and demand for short-term credit), performance (return on assets and sales growth) and credit terms with banks (tangible asset ratio and interest rate). The study concluded that when the interest rate the bank sets is too high, the proportion of accounts payable rises and the bank loses its amount of loans.

Ogawa et al. (2011) used cross-sectional survey data on Japanese SMEs to conduct and investigate whether bank credit and trade credit are substitutes. The proportion of intermediate goods purchased from large suppliers was their dependent variable. Sales, Profit (the ratio of operating profit to sales), Debt (the debt-asset ratio), Bank-Depend (customer's dependence on the bank credit), and the industry dummies were independent variables used to estimate the model. They concluded that SMEs with little access to bank credit are dependent more on large suppliers for trade credit, which

suggests that trade credit and bank credit are substitutes.

Molina and Preve (2012) studied the sample of 85,727 US firms from Compustat that have accounts payable data available from 1978 to 2000 to estimate the equation using both fixed effects and pooled OLS. The study focused on the firms in financial distress and their use of supplier's trade credit. The dependent variable was trade credit measured in three different ways (account payable, account receivable and net trade credit). The independent variables consisted of financial distress dummy variable, financial leverage, sales growth and the dummy representing years in financial distress. They study concluded that firms that are financially distressed use substantial volume of trade credit to substitute for other sources of finance. Especially smaller firms, that has less market power, and exclusive products tend to use more trade credit financing when they are financially distressed. However, they made an interesting observation that firms that increase their accounts payable substantially when facing financial distress, experience a drop of at least 11% in sales and profitability growth. This supports the substitution hypothesis.

Danielson and Scott (2004) estimated their model using the 1995 firm-level data conducted by the National Federation of Independent Business. The model was estimated using a simultaneous equation using the bivariate probit method. The study modelled the trade credit demand as a function of bank loan availability, trade credit price, and firm/industry characteristics. They found that firms increase their demand for trade credit when facing credit constraints from banks, hence trade credit serving as a substitute for bank credit.

Carbó-valverde, et al (2016) using over 40,000 Spanish SMEs firm-level panel data analysed whether trade credit is an alternative source of external finance to SMEs during the financial crisis. The study used the Max likelihood method, using bank credit as the dependent variable and sales, cash flow, loan interest spread and the GDP growth as independent variables. Like other recent studies using European SME data, they study concluded that there is significant evidence that trade credit is an alternative

source of external finance to SMEs during a financial crisis. Nevertheless, they also concluded that SMEs access to trade credit and bank credit as external finances differs across firms. During the crisis, the access to these external sources of finance changes, financially constrained SMEs depend on trade credit and not bank credit. In contrast, firms that are not financially constrained are dependent on banks loans but not trade credit during the financial crisis. Therefore, this suggests that trade credit is an essential instrument that helps some SMEs cope with the financial crisis.

Blasio (2005) studied Italian manufacturing firms microdata from 1982 to 1999 collected from firms accounting data. The study examined the firms' inventory behaviour to identify if bank credit and trade credits are substitute during the tight monetary policy period. The study estimated a standard inventory investment model augmented by measures of internal resources that include both liquidity and trade credit. The dependent variable was the log of first differenced end of period inventories. The independent variables included the inventory-sales ratio, firm sales, the ratio of cash and marketable securities to total assets, and the ratio of net trade credit to total assets. The study concluded that inventory investment of Italian manufacturing firms is constrained by the availability of trade credit and that this effect was more than double during financial restrictions period. However, the study argued that the magnitude of the substitution effect is not sizeable.

Levchuck (2002) investigated trade credit phenomena in Ukraine. He used micro-level financial data for 609 Ukrainian enterprises consisting of balance sheets, financial statements, and ownership data over 1999 and 2000. The study analysed the determinants of trade credit usage and tested the existence of a substitution effect between trade credits and bank credit. The dependent variable was bank credit ratio, which is the ratio of short-term firm's credit to accounts payables, bank credit to sales ratio and accounts receivables or accounts payables ratio to sales. Independent variables were collateral, sales growth, quick ratio, and net profit. The study found that firms' arrears and financial needs are strongly associated with higher trade credit, while

better access to bank lending is associated with less trade credit. This study support that bank credit and trade credit are substitutes.

Özlü and Yalçın (2012) studied trade credit channels in Turkey by using the fixed effect model on a panel of firms between 1996 and 2008. The study used three dependent variables, namely, trade credits to total liabilities, trade credits to the sum of bank credits and trade credits, and bank credits to total liabilities. The independent variables were variables representing the monetary policy rate and firm-specific characteristics including; overnight interest rate, the size of the firm and short-term bank credit to total assets. The study suggested that the composition of external finance varies significantly across different firms and different financial conditions. The study concluded that SMEs in the manufacturing industry and firms with a low export share are less likely to have access to bank finance, especially in tight monetary policy periods; hence, financially constrained firms substitute trade credits for bank credit as monetary policy tightens.

Using the firm level Euro data, Casey and O'Toole (2014) aimed to determine if financially constrained SMEs are likely to opt for the alternative external finance such as trade credit, informal lending, market financing and state grants etc. The dependent variables were binary, requiring the use of a probability choice model. The study used a probit approach assuming a normal distribution for the functional form. The independent variables were a vector of country controls and vector of firm-level controls to identify firm creditworthiness, quality, and risk. The study also included country and firm fixed effects as well as time effects in the error term. The study concluded that there is a correlation between credit-rationed firms and trade credit. This correlation rises with the size and the age of the firm. The study determined that financially constrained firms are inclined to use informal lending but they did not find any evidence supporting that bank-constrained SMEs apply for, or use "market finance", instead they are likely to apply for "grant finance". Lastly, they found that firms that are denied funding for working capital tend to turn to trade credit, while informal lending tends to act as a substitute for bank investment loans.

The observation that can be made from these studies is that most of them used the

firm-specific factors to examine the nexus that trade credit is a substitute to bank credit. Most of these studies were conducted using European data, which can suggest that there could be continent-specific signals that drove most research conducted using European data to conclude that trade credit and bank credit are substitutes. Almost all research studies focusing on the vulnerable firms and SMEs were conducted in Europe because of a lack of firm-level data on SMEs in the US and other countries (Carbó-valverde et al., 2016). Hence, it makes sense why most of the studies based in Europe supported the substitution hypothesis. Nevertheless, contrary to this statement, are the results of the study conducted by Petersen and Rajan (1994, 1997) that used both macroeconomic and firm-specific data and were conducted using US data. These findings raise an empirical question why trade credit is available when bank credit is rationed. Trade credit providers are also likely to be credit constrained and to have high cost of funds than banks. Therefore, when banks cannot lend, suppliers should not be able to lend either.

2.6.2. Trade credit and bank credit are complementary

Empirical evidence consistent with the theories provided by Smith (1987), Mian and Smith (1992) and Wilner (2000) that trade credit and bank credit are complements has been growing. This nexus appears to be supported by the empirical findings of Garcia-Appendini (2011) who used the US small non-financial and non-farm businesses' 2003 survey data. He concluded that banks were more likely to lend to enterprises that settle their accounts payable debts on time. There has also been a growing interest on theories provided by Biais and Gollier (1997) and Burkart and Ellingsen (2004).

Atanasova (2012) used a panel of UK companies over 1998 to 2006 using difference GMM estimation to determine the choices between bank credit and trade credit. The dependent variable was short-term bank loans to sales ratio. Independent variables were accounts payable to sales ratio, Interaction dummies to indicate size, age, cash ratio, leverage, and collateral of the firm. The study concluded that bank credit and trade credit have a complementary relationship when firms are characterised by information asymmetry problems and agency cost. This study supports the signalling role of trade

credit where trade credit information can be used to signal firms quality to banks.

Likewise, using the micro-data of Italy SMEs, Agostino and Trivieri (2014) empirically investigated the signalling hypothesis formulated on the role of trade credit. The ratio of short-term bank credit to total assets was their dependent variable. Among many, the independent variables included the ratio of (short- and long-term) trade debt to total asset, duration of the relationship with the main bank, the interaction term, and a vector including a set of control variables. They concluded that trade credit has an information content for banks. These findings are consistent with the theories by Biais and Gollier (1997), Burkart, and Ellingsen (2004) theory.

Also consistent with the Biais and Gollier (1997) and Burkart and Ellingsen (2004) theory, Gama and Mateus (2010), using SMEs data set of Portuguese and Spanish firms, and GMM estimators, concluded that trade credit allows small firms to improve their reputation. As trade credit discloses the private information to the bank, banks can change their beliefs about default risk related to a particular customer and agree to provide bank credit.

Using the balance sheet data of US small Nonfinancial Firms (SSBF) 1998, Garcia-Appendini (2007) tested whether suppliers have an information advantage over banks. The study was conducted using the probit regression. The study concluded that banks provide more credit to opaque firms that have been granted trade credit by suppliers. Firms that have been denied trade credit are usually also denied bank credit. This indicates the information advantage of suppliers over banks, supporting the signalling role of trade credit.

Saito and Bandeira (2010) used the Brazilian Publicly-Listed Companies data to estimate their model using the indirect least squares method, applied to a simultaneous equation system. The independent variables included accounts payable, total debt, current assets, total income, firm’s age, sale’s growth, pre-tax earnings, ownership share of principal owner, firm size, depreciable assets, the dummies proxies for the use of capital lease and use of loans from stockholders, and the dummies for industry

control. The study found empirical evidence that listed firms do use bank credit and trade credit as two complementary sources of financing. This is in line with recent theoretical studies (Biais & Gollier, 1997). Furthermore, by using a sample of 263 publicly listed companies from 2006, the study concluded that trade credit may be used as a sign of the firm's quality, hence can be used as a way to facilitate access to bank credit.

Aktas de Bodt, Lobez, and Statnik (2010) studied the US listed firms between 1992 and 2007 using information from Compustat's database and the four-factor model. The study derived a theoretical model to estimate the relationship between the quality of the firm's investment decisions and firms' intensity of trade credit. The study used two different dependent variables. The first was the percentage change in Z-score between two successive years and the second one was the firm's Jensen's alpha. Their independent variables were working capital divided by total assets, retained earnings divided by total assets, earnings before interest and taxes divided by total assets, the ratio of market value of equity to the book value of total debts, and total sales divided by total assets. Trade credit was measured by the ratio of accounts payable to total assets. The study included three additional firm-specific control variables: debt ratio, cash ratio, and finished goods inventories ratio. The study concluded that the Z-score and long-run abnormal returns serve as proxies for the quality of firm investment projects.

Pike, Cheng, Cravens, and Lamminmaki (2005) studied 700 large firms in the US, UK, and Australia, using the Logit model to explored trade credit terms with the aim to determine if trade credit reduces information asymmetries and discriminatory pricing hypotheses. The conclusion of the study supports both theories of reducing information asymmetries and discriminatory pricing.

Psillaki and Eleftheriou (2014) using a sample of French SMEs from four industries investigated the impact of the global financial crisis on the allocation of credit to SMEs and the relationship between bank credit and trade credit. The study used the fixed effects panel regression model. The dependent variable that they used was the flow in bank borrowing repayable within one year. The independent variables were the flow of

trade credit payable, the gross fixed over total assets ratio and the return on total assets. The study concluded that trade credit for small firms during tight monetary policy periods are a complement rather than a substitute to bank credit. This study empirically supports the redistribution theory of trade credit.

Ziane (2004) used a sample of French SMEs to examine the determinants that affect the use of trade credit using the OLS estimates and logit estimates. In this study, both the transaction and financing components were included in the model. The study modelled the transaction component as a function of transaction costs, and the financial components as a function of bank credit rationing and financing risk. The dependent variable was the trade credit demand realised by firms. The study concluded that a higher volume of transactions, and greater financial and business risk, are associated with a greater demand for trade credit, which suggest that trade and bank credit are complementary.

Using firm-level data for a group of six emerging economies, Love et al. (2005) investigated the effect of financial crises on trade credit. They concluded that financially constrained firms are more likely to reduce the provision of trade credit to their customers in the event of a financial crisis. Their findings also indicate that firms that are highly dependent on short-term bank credit are the main suppliers of trade credit during non-crisis periods. During the crisis, they observe a significant positive relationship between bank credit and the provision of trade credit. They concluded that firms that are successful in securing bank finance 'redistribute' it to firms unable to do so in the form of trade credit. This mean that financially strong firms get credit from banks, and redistribute the credit in a form of trade credit to financially constrained firms.

The main shortcomings of majority of the studies based on Biais and Gollier (1997) and Burkart and Ellingsen (2004) theories is that, they fail to explain why a banks as specialist in the evaluation of borrowers creditworthiness, would have less information than trade credit providers or suppliers. Moreover, whilst it is generally accepted that suppliers have information than banks, why the theories do not explain why suppliers

regularly lend inputs, but only very rarely lend cash. Nevertheless, it can be observed from these empirical findings that complementary hypothesis comes in different forms, either in the form of redistribution or revealing trade credit private information to the bank. Consequently, banks may update or change their beliefs about customer default risk and extend the bank credit.

2.6.3. Mixed results

From the theoretical point of view, Burkart and Ellingsen (2004) took a neutral view. The hypothetical model entailed that it is possible for bank credit and trade credit to serve as either complements or substitutes based on two fundamental assumptions. Suppliers can monitor their customer better than banks, and this may grant them an advantage when compared to the banks in input transactions as they are directly involved. Hence, banks and suppliers exposure to the moral hazard is not the same because inputs are less liquid, and thus less easily diverted than cash (Agostino and Trivieri, 2014). If banks recognise that the relative illiquidity of inputs makes investing preferable, banks are inclined to lend thus the two sources of financing are complements (Agostino and Trivieri, 2014). According to Burkart and Ellingsen (2004), this is the case only when the firms' aggregate debt capacity limits investments, thus when this is not the case, bank credit and trade credit are substitutes.

Empirically taking the neutral view, Yang (2011) using the data from US manufacturing firms built an inventory model where bank credit and trade credit coexist and used the GMM to estimate the structural parameters. The author indicated that substitute effects and complementary effects are not "mutually exclusive" but these effects interact together. Furthermore, the study indicated that the complementary effect dominates the substitute effect, depending on the credit market conditions. During tighter monetary policy period, trade credit becomes relatively cheaper and tends to substitute bank credit mostly, and during the loose monetary policy, the complementary effect tends to prevail.

Alatalo (2010) analysed 1,084 manufacturing firms in the UK to examine the patterns of

trade credit during a financial crisis using the panel data technique. The study also aimed to determine whether firms' susceptibility to the financial crisis affects the potential change between different sources of finance. The dependent variables used were accounts payable, accounts receivable and net trade credit while the independent variables were cash flows/assets, cash balance/assets, the logarithm of total assets (SIZE) and logarithmic sales growth. The study indicated a robust evidence of a decreasing use of trade credit in 2008 and some limited evidence of a decrease already in 2007. Hence, the study indicated no support for the theory of trade credit channel. The author found a positive relationship between trade credit and firm size in 2008, but the scale of the effect was small compared to the overall negative effect of the year. Larger firms decreased the provision of trade credit less than smaller firms, but the study found that size was positively related to change in obtaining trade credit during both 2007 and 2008.

Zhang (2011) using the fixed effects models studied a sample of publicly traded firms in Thailand during the period 1994 to 2005. The study aimed to determine, whether enterprises use less trade credit in the context of better information sharing if financially constrained enterprises are more dependent on trade credit and if the improvement in information sharing reduces trade credit sensitivity to use firm-specific factors. The study used trade credit as a dependent variable. The independent variables were financial constraint dummy, information sharing dummy, cash ratio, cash flow, leverage, and interest ratio. Zhang obtained three different findings. The study found that Thai firms became less dependent on trade credit as a result of better information sharing, financially constrained enterprises redistributed more funds in a form of trade credit; and the correlation between trade credit and firm-specific factors such as liquidity, tangible assets, and firm size weakened as information sharing improved. These results are consistent with the view that better exchange of information facilitates credit allocation. The study also supported that bank credit substitute's trade credit.

Lin and Chou (2014) used the quarterly data of 1213 Chinese firms from the first quarter of 2006 to 2012 to examine the relationship between bank credit and trade credit

especially during the 2008-2009 global financial crises. Using the fixed effect model, the study used accounts receivable, account payable and net trade credit as dependent variables, bank credit, period dummies, and other control variables such as sales, total assets, and cost of sales, inventory and cash flow as the independent variables. They found a significant positive relationship between accounts receivables and bank credit and a significant negative relationship between accounts payable and bank credit. This confirmed both the complementary and substitute relationship.

Engemann, Eck, and Schnitzer, (2014) used data provided by the Economic and Business Data for years 1994–2009. The model was estimated using the two-step GMM estimator for panel data method. The dependent variable was bank credit. Trade credit was the independent variable of the study's interest. They included a financial constraint dummy variable and an interaction term of trade credit received. The study concluded that in general, trade credit and bank credit are substitutes. In addition, the study found that for financially constrained exporters the substitution effect is weak. Their findings were also consistent with the positive signalling effect of trade credit on bank credit. The study attributed this finding to trade credit's ability to reduce the uncertainty that makes banks more willing to extend additional bank credit to financially constrained exporters.

Cai, Chen, and Xiao (2014) investigated a panel of 674 firms in China over the period 2001–2007. The study employed the simultaneous equation modelling with panel data approach generalised two-stage least squares (G2SLS) and random effects regression. The independent variable was bank credit, and the independent variables were trade credit, solvency ratio, inventory, sales, and cash. The study proved that the two credits are complementary if the retailer's internal capital is low but become substitutable as the internal capital grows.

2.6.4. Empirical evidence based in Africa

In Africa, there are a few empirical studies on trade credit. Most of the African-based studies did not focus their attention on whether trade credit is a substitute or complement to bank credit, but looks at access to trade credit by different ethnic groups and other attributes.

Looking at productivity gains from trade credit, Fisman (2001) used basic hypothesis from a cross-section of African firms (Côte d'Ivoire, Kenya, Tanzania, Zambia, and Zimbabwe), and show that trade credit is positively related to capacity utilisation. This suggests that there may be significant productivity gains from an increase in the availability of trade credit. As a result, Fisman (2001) suggested that steps should be taken to increase credit information for suppliers and improved contract enforcement for credit liabilities.

Fisman and Raturi (2000) investigated the impact of competition on the relationship development using trade credit data from five African countries (Ghana, Kenya, Tanzania, Zambia, and Zimbabwe). They utilised two different models; random effects logit, and conditional fixed effects logit model, and they showed that competition among firms has a positive effect on incentives to establish long-term cooperative relationships. For an average firm, the probability of obtaining trade credit increases from 40% to 60% after switching from a monopolistic market to a competitive supplier market. A high level of competition makes switching suppliers very costly and hence promotes 'lock-in' between suppliers and customers.

Fafchamps (1996) studied Zimbabwe manufacturing firms using a case study and panel survey. The study concluded that black entrepreneurs face the difficulty in distinguishing themselves from many firms that are financially constrained and short-lived in Zimbabwe. These entrepreneurs also lack business contacts. Hence, they are disadvantaged and unable to access trade credit. Similar to the study that Fafchamps did in Zimbabwe, using RPED data, Fafchamps et al. (1994) identified that the use of trade credit in Kenya increases with firm size. Their evidence suggests that micro enterprises are rationed out of the trade credit market and that small firms in Kenya are not heavy users of trade credit. Ethnicity is also found to be a major factor, with black-owned enterprises receiving the least trade credit. On the other hand, Bade and Chifamba (1994) conclude that in the case of Zimbabwe, firms are more likely to secure trade credit if they regularly purchase in bulk, if they are more profitable, and if they have an overdraft facility. Fafchamps (1997) found that Zimbabwean firms use a

combination of statistical discrimination, formal screening, reputation, and acquaintance when extending trade credit. Established firms use credit application forms, bank, and trade references to select qualifying recipients of trade credit. The study found that reputation and relationships are the most important instruments for accessing trade credit and enforcing payment.

Fafchamps (1999) concludes that network effects are significant determinants of access to trade credit by black-owned and female-headed enterprises in Kenya and Zimbabwe. He found that ethnicity and gender have minimal effects on access to bank credit. However, these attributes have a strong negative impact on the ability of entrepreneurs to access trade credit. His results indicate that blacks and women are penalised for their lack of connections with the business community, and their inability to signal their creditworthiness among a pool of inexperienced micro enterprises.

Hermes, Kihanga, Lensink, and Lutz (2011) studied the impact of trade credit on customer switching behaviour in Tanzania using primary survey data. They concluded that there is a negative relationship between trade credit and customer switching behaviour. This entails that trade credit acts as a switching barrier. Hence, retailers hesitate to shift to another supplier if they are dependent on trade credit as a source of external finance. Measures of customer switching were their dependent variable, and they measure it with a dummy variable that is equal to 1 if a retailer stopped buying on a regular basis from the supplier, and the dummy variable equals 0 if the retailer bought from the same supplier over the entire two-year during their period of study.

Fatoki and Odeyemi (2010) studied SMEs in the Eastern Cape Province of South Africa to identify the determinants of access to trade credit by new firms using logistic regression. The study used the primary research and collection of data using a survey. Data were collected from 417 respondents. The study concluded that business size, business plan availability, competency of management, insurance, incorporation, location, previous relationship, and trade associations are the determinants of access to trade credit by SMEs in South Africa.

Otto's (2014) study established whether trade credit is being mismanaged by SMEs in South Africa. The study used questionnaire administered to 352 SME respondents. Based on the statistical techniques such as descriptive statistics, frequencies, matched samples t-test and the McNemar test, the study recommended that SMEs should improve the management of trade credit.

Fakoti (2014) investigated the perception that trade creditors' has on new small businesses regarding risk and benefit. The study used a survey based on self-administered questionnaires. The study provided some descriptive statistics to analyse the data. It was concluded that trade creditors perceive new small businesses as risky but beneficial to their business. These findings suggested that lack of access to trade credit by new small businesses is caused by the perception of risk but not the lack of interest.

Fakoti (2012) investigated whether the ethical challenges faced by new SMEs are a constraint on the availability of trade credit as a major source of external debt finance. The study used survey data collected through self-administered questionnaires. Data analysis included descriptive statistics, Chi-square goodness of fit test, t-test, and ANOVA. The study concluded that ethical challenges faced by new SMEs impact on the availability of trade credit and recommended improvement in the ethical behaviour of new SMEs.

Kwenda and Holden (2014) explored a balanced panel data that was collected for 92 listed enterprises in South Africa over 2001 to 2010. The study employed the GMM estimation method as a way control for any potential endogeneity problems and unobservable heterogeneity. The study examined the factors that influence the use of trade credit for enterprises listed on the JSE. The study concluded that enterprises have a targeted level of trade credit (account payable). The study also found that enterprises' internally generated resources, investment opportunities, and short-term financial debt play a significant role in their decisions to use trade credit as a source of finance for the listed enterprises. Finally, the study recommended that firms should focus on relationships with their suppliers, as their trade credit is a vital source of funding.

2.7. Conclusion

Although conclusions must be described with caution, from the theoretical evidence it is shown that trade credit plays a role in financial intermediation. One can see that trade credit plays a critical role either motivated by the transactional or the financial motive, and either as a substitute or complement to bank credit. The transaction motives were explained from theory provided by Ferris (1981). The theory entails that trade credit plays a role in enabling less frequent payments, which reduces transaction cost. Trade credit could be utilised to gain a mean to price discriminate between different customers. Another motive for trade credit is reducing informational asymmetries and preserving the equity stake invested on the customer. The financing motives were explained from theory provided by Mian and Smith (1992). Furthermore, Jain (2001) posits that suppliers have the greater advantage in monitoring customers, the ability of suppliers to control the customer, and higher recouping value of the collateral.

The theories and empirical evidence indicate that trade credit plays a role in financial intermediation, but a conclusion cannot be drawn from the literature review on whether it plays a substitutive role or complementary role. Most of the earliest theories and empirical evidence supported the substitution role, while recently there has been increasing support for the complementary role. The complementary can be in a form of redistributive hypothesis or signalling role of trade credit.

CHAPTER THREE

OVERVIEW OF THE SOUTH AFRICAN FINANCIAL SECTOR AND TRADE CREDIT MARKET

3.0. Introduction

South Africa has experienced significant positive changes in the financial sector over the past 20 years through legislation, consolidation, and technology. South Africa in now a stable democratic and legislative environment, which has become a strategic gateway to Africa (Djoumessi, 2009). Numerous foreign banks established branches or representative offices in South Africa and others acquired stakes in South Africa's major banks. The legislation, products, technology, and the number of participants in the financial sector increased, and this enhanced the level of competition. Currently, the banking industry in South Africa consists of 17 commercial banks, two mutual banks, 12 foreign banks branches, and 41 foreign banks with local representative headquarters (BASA, 2015).

South Africa banking system is considered to be well-developed and regulated and can be compared favourably with many industrialised countries. South Africa banking system was ranked third out of 148 countries in the 2013/14 World Economic Forum (WEF) Competitiveness Survey (BASA, 2014)[3]. As already stated, this is not across all segments; the formal sector can easily access bank credit, while the informal sector struggles to access bank credit (Turner et al., 2008). One of the contributions to this is that it has become more common in the financial sector to rely on automated underwriting; as such, lenders have moved into relying on standardised data when granting credit. Thus, the financial institutions' default assumption is that insufficient information is associated with high credit risk. Owing to insufficient credit information, lenders assume that many entrepreneurs in South Africa are too risky for credit (Turner et al., 2008).

[3] BASA, SOUTH AFRICAN BANKING SECTOR OVERVIEW http://www.banking.org.za/docs/default-source/publication/banking-sector-overview.pdf?sfvrsn=6 Accessed 25 October 2015

Many countries collect trade credit data for commercial lending, and the formal economy in South Africa collects trade credit data (Turner et al., 2008). It is also common in many countries to collect non-financial payment data when standard credit information is unavailable. This suggests that a structure for sharing credit information and credit reporting can increase access to credit. However, South Africa rarely collect this kind of information (Turner et al., 2008). Nevertheless, the ability to get funding is critical to any business. Access to credit is vital to ensure enterprises' growth and sustainability, which subsequently enhances the country's growth, employment, and the asset formation.

3.1. Historical overview

A number of commercial banks dominated South Africa's financial industry before the 1950s. By then, commercial banks used to provide only a certain numbers of financial services. The industry did not provide some crucial services such as credit card facilities personal loans, and property leasing. This has since improved subsequent to the development of new institutions such as merchant banks and discount houses, etc.

The policy framework during the pre-apartheid period was not conducive for growth (Chauhan and Sibanda, 2012). Between 1961 and 1993, South Africa strengthened the exchange controls through the Exchange Control Regulations Act to avoid the weakening capital account (Chauhan and Sibanda, 2012). To facilitate the exchange controls, South Africa adopted a dual exchange rate and introduced the financial rand for non-resident transactions (Chauhan and Sibanda, 2012). However, the exchange controls had adverse effects on the economy by distorting the allocative efficiency of the market economy.

Furthermore, before 1994, the South African financial sector confronted many challenges emanating from apartheid government. These include among others, international sanctions and political isolation. As a result of international sanctions, the country was hit by a debt crisis in 1985. The debt crisis emanated from the decision when a group of international banks withdrew substantial credit lines. Furthermore, as a

result of sanctions, many foreign corporations decided to sell their South African investments (Djoumessi, 2009).

Investors' perception was only altered owing to political liberalisation and the successful transition to democracy in April 1994 and South Africa re-opened itself to international financial markets. The aim of liberalisation was to attract foreign investments, support a sounder market, and enhance acceptance and participation in the world economy; contributing to economic growth. South Africa lifted the "stand-still" arrangement with foreign creditor banks. Thereafter the short-term credit was made available to South African banks, and many foreign banks returned into the South African market (Djoumessi, 2009).

For South Africa to accomplish these milestones there had to be policy reform to maintain and develop a stable and healthy financial sector. This consisted of improving economic policies and amending the regulatory and legal framework. Table 1 illustrates some of the policy frameworks that were adjusted and improved. It can be deduced from Table 1 that the policies before 1994 were restrictive. Starting from 1995, the government relaxed and abolished some of the restrictive policies.

For instance, the government gradually started to phase out exchange controls in 1993 subsequent to positive political developments. The major step towards relaxing the exchange controls took place in 1995 when the dual exchange rate system was brought to an end. Thereafter, the government gradually relaxed other exchange control measures that facilitated easier cross-border movements in capital. According to Gidlow (1995), these efforts helped to minimise the problem of illiquidity and increased competition, which reduced transaction costs and improved economic efficiency. However, exchange controls over residents and emigrants were, maintained. Significant relaxation over residents was only effected in 1997.

Table 1: Policy framework pre and post-apartheid

Date	Description
Prior to the 1980s	- Period of export subsidies, Import control, high import duties. - Credit ceilings and the deposit interest rates were controlled.
1980	- Abolished deposit interest rate controls and credit ceilings. - Abolished the 7,5 per cent surcharge on imports.
1985	- Reintroduced the surcharge on imports. - Capital controls tightened
1986	- Money supply targeting introduced.
1995	- Introduced reduction in import duties - Abolished Remaining surcharge on imports. - Exchange controls on non-residents eliminated
1997	- SA stopped requiring gold producers to market their gold through SARB. - Foreign banks allowed opening branches in South Africa. - Controls on residents relaxed
1998	- Announcement of inflation targeting and - Money supply guidelines
2000	- Formal inflation targeting introduced.
2003	- Became a member of the Financial Action Task Force (FATF) [4]
2005	- Introduction of the National Credit Act (NCA)
2008	- Upgrade to Basel II.
2011	- Upgrade to Basel III. - Draft Credit Ratings Services Bill to provide for the conditions for the issuance of credit ratings - Announcement of Twin-peak approach

Source: Cross (2003) in Chauhan and Sibanda (2012)

South Africa now has a sound regulatory and legal framework. The regulations are tight, and they protected the financial sector from the financial crisis in 2008. The financial sector is sophisticated, and it boasts domestic and foreign institutions providing a full range of services (Djoumessi, 2009). The South African banking system as a major part of the financial sector is sound and developed and well regulated. It consists of a central

[4] This was in order to combat money laundering.

bank, that is, the South African Reserve Bank (SARB), as well as a few large commercial and mutual banks, investment institutions, and a number of smaller banks.

The legislation that governs the banks are the Banks Act 1990 and the Mutual Banks Act 1993. SARB enforces these pieces of legislations in the office headed by the Registrar of Banks. SARB is responsible for registration of institutions such as banks and mutual banks in addition to administering the requirements of the Banks and Mutual Banks Acts.

The Banking Association of South Africa (BASA) is an industry representative for all banks in South Africa. Its mandate is to represent the sector and represent the industry through lobbying, engagement with stakeholders and political influence (BASA).

The Financial Service Board (FSB), on the other hand, oversees the non-banking sector. FSB is an independent body that is responsible for the regulation of financial markets and institutions, including brokers, fund managers, and insurers.

The FSB administers the following legislations:

1. Credit Rating Services Act (Act 24 of 2012);
2. Collective Investment Schemes Control Act (Act 45 of 2002);
3. Financial Institutions (Protection of Funds) Act (Act 28 of 2001);
4. Financial, Advisory and Intermediaries Services Act (FAIS Act) (Act 37 of 2002);
5. Financial Markets Act (Act 19 of 2012);
6. Financial Services Board Act (Act 97 of 1990);
7. Financial Services Ombud Schemes Act (Act 37 of 2004);
8. Financial Supervision of the Road Accident Fund Act (Act 8 of 1993);
9. Friendly Societies Act (Act 25 of 1956);
10. Inspection of Financial Institutions Act (Act 80 of 1998);
11. Long-term Insurance Act (Act 52 of 1998);
12. Pension Funds Act, 24 (Act 24 of 1956); and
13. Short-term Insurance Act (Act 53 of 1998) (FSB).

The National Credit Regulator (NCR) is an institution that is responsible for the

regulation of the South Africa credit industry. NCR is responsible for the registration of credit bureaus, credit providers, and debt counsellors. Its mandate is to administer National Credit Act (NCA) and ensure that the industry complies with the act, and develop an accessible credit market to promote the needs of economically marginalised South Africans.

Lastly, the Credit Bureau Association (CBA) is an association that endorses fair and equitable services, representing nine out of the 14 registered credit bureaus. It ensures that credit bureaus deal with information confidentially and accurately, provide relevance, and utilise data in accordance with international best practice. By facilitating a reasonable practice within the credit bureau industry; CBA aims to provide a framework for a sustainable and well-functioning credit information system.

3.2. Lending condition in South Africa

In South Africa, the total credit to the economy increased since 1994. Between 1994 and 2001, domestic credit to the private sector increased from 111% to 138% of GDP, GDP (SARB). This reflects that the banking system has increased credit access and indicates new entrants to the banking sector. In addition, bank deposits rose from 14% in 1993 to 90% in 2012 (SARB). This indicates that the financial size and depth as measured by the bank deposits have been stable.

The number of commercial banks branches per 100 000 adults increased from 2004 to 2006 (SARB). The same applies to the number of commercial bank branches per 1000 square metres. On average, the number of commercial bank branches per 100 000 adults increased from 4.74 in 2004 to 10.24 in 2012 and the number of commercial bank branches per 1000 square metres increased from 1.26 in 2004 to 3.05 in 2012 (SARB). The assets of the banking institutions as a percentage of GDP increased steadily from 22% in 1994 to 129% in 2012 (SARB). This indicates that the breadth of the financial sector increased significantly.

After the introduction of the NCA in 2007, there was a drop in credit granted to the

South African market (NCR). However, in 2009, there was a turning point. The credit granted started to grow and in 2012 went back to the level of the end of Quarter 4 in 2007 (NCR). The size of the credit market at the end of 2011 was R1.3 trillion (NCR). Banks are the prominent credit providers. Nevertheless, while the South African banking sector is one of the best in the world, the population remains significantly under-banked. The rejection rate of small firms that apply for bank-sponsored schemes is high and even registered micro enterprises are least likely to have access to credit.

Underhill Corporate Solutions conducted a study for the NCR in 2011 to examine if there is SME financing gap in South Africa. A "financing gap" refers to a proportion of economically significant SMEs that cannot obtain credit. They estimated the total financing gap at around 45-48% of all SMEs in South Africa.

In aggregate, when looking at all the credit provided to customers, the total number of credit agreements entered into was 4.51 million for the quarter ended June 2016 based on the NCR Consumer Credit Market Quarterly Report[5]. Out of the 4.51 million, banks accounted for 77.45% of the total value of credit granted. This is indicated in Figure 1. The non-bank vehicle financiers extended 9.34%, retailers 2.74%, and other credit providers 10.47% of the 4.51 million.

[5] See https://www.ncr.org.za/documents/CCMR/CCMR%20June%202016.pdf accessed 27 January 2017

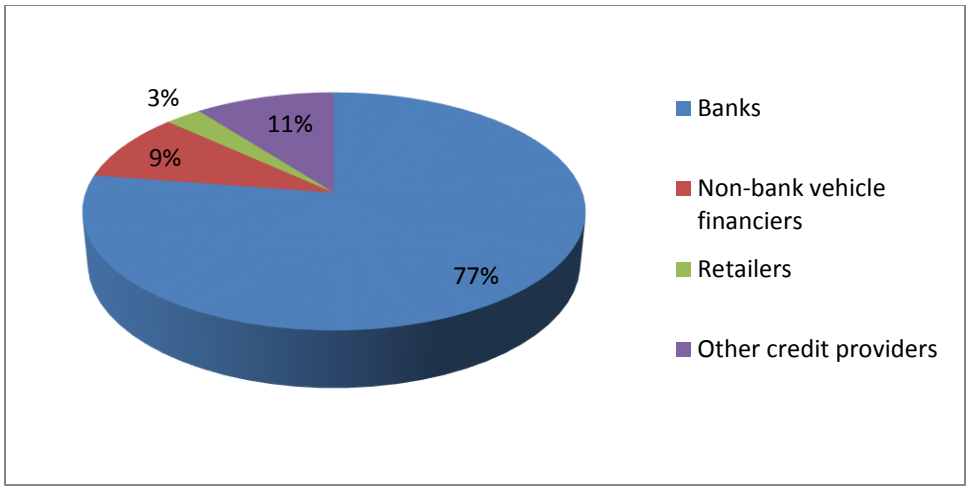

Figure 1: Credit granted per industry as at June 2016

Source: NCR 2016

The number of application to these industries was 9.9 million, of which 5.3 million or 54.44% was rejected as indicated in Figure 2, and only 46% was accepted. This indicates that the credit rejection level is very high. The number of applications that are rejected is above the number of accepted applications.

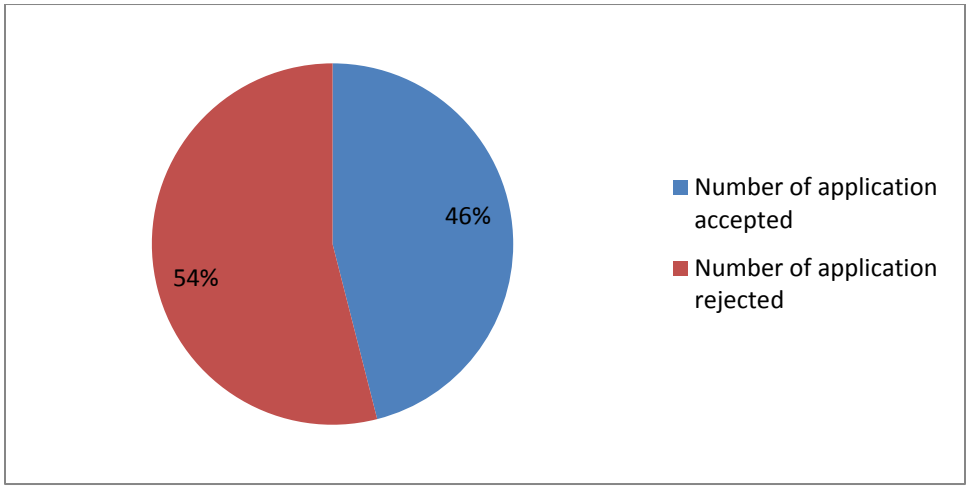

Figure 2: Number of application and rejection as at June 2016

Source: NCR 2016

Figure 3 indicates the composition of the credit provided. Most of the credit was secured credit (33.19%), followed by mortgages agreement (33.11%) and credit facilities (11.13%). These types of credit are defined as follow:

> ***Credit facilities*** *- An agreement that meets all the criteria as set out in section 8 (3) of the NCA. The values (rand value and number of accounts) reported for "credit facility" includes both new credit facilities and limit increases for existing credit facility agreements. These values represent the potential exposure of the credit providers and not the actual usage/consumption by consumers. This does not apply to the gross value of the debtors book values where actual credit usage by consumers is reported.*
>
> ***Mortgage agreements*** *- An agreement that is secured by a pledge of immovable property. Secured credit transactions- Credit transactions that do not fall within the other named categories in the NCA. This category includes pension-backed loans, insurance-backed loans, retail furniture accounts and motor vehicle accounts.*
>
> ***Short-term credit transactions*** *- An agreement that meets all the criteria as set out in section 39 (2) of the National Credit Regulations. This includes amounts not exceeding R8 000 and repayable within 6 months.*
>
> ***Unsecured credit transactions*** *- An agreement that meets all the criteria as set out in section 39 (3) of the National Credit Regulations, where the loan or credit is not secured by any pledge or personal security.*
>
> ***Developmental credit transactions*** *- Developmental credit agreement means a credit agreement that satisfies the criteria set out in Section 10; This includes educational loan; small business; the acquisition, rehabilitation, building or expansion of low-income housing; or any other purpose in terms of subsection (2) (a).*

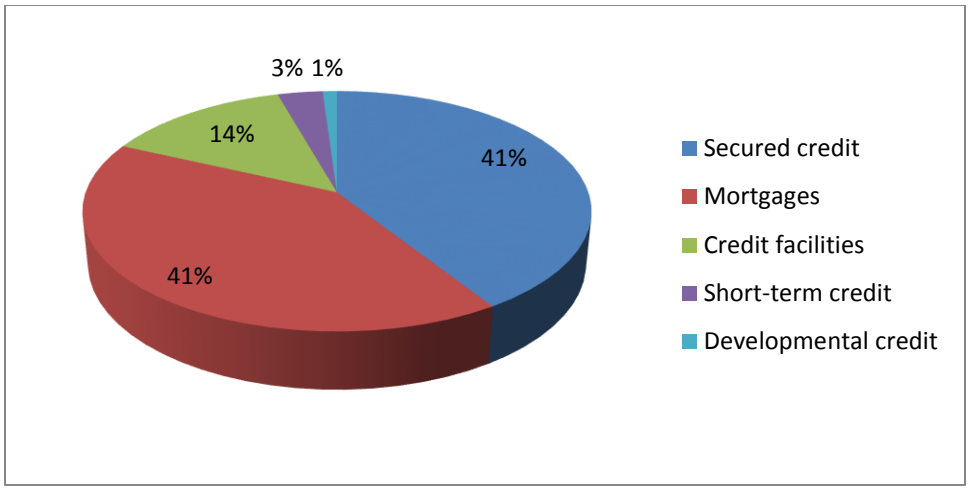

Figure 3: Credit granted type as at June 2016

Source: NCA 2016

Moreover, Driver, Wood, Segal, and Herrington (2001) reported that financial institutions in South Africa mainly deal with large corporations that undertake large projects. Driver et al. (2001) further claim that banks do not support enterprises through a process and would rather lend more to one customer than lend insignificant amounts to many customers because it is costly and involves too much paperwork for the banks.

3.3. Information provision from Credit Bureaus

Credit bureaus play a major role in South Africa. Individuals and consumers' creditworthiness is measured based on information provided by credit bureaus. The credit bureaus do not have the power to decide on the granting of credit, but they collect information that indicates credit habits and history and used to create a credit score. Creditors, such as banks use this information to decide whether to grant credit. Hence, credit bureaus prevent adverse selection and moral hazard because credit decisions are made with the best possible information.

There are 14 registered credit bureaus in South Africa. According to the second quarter Credit Bureau Monitor 2016, credit bureaus hold records for 24.08 million credit-active consumers. Consumers classified in good standing were 14.41 million consumers in

2016. The number of consumers with impaired records was 9.67 million in 2016. The number of accounts was 84.56 million, and out of this, the number of impaired accounts was 20.24 million. About 434 million enquiries were made on consumer credit records. Enquiries that were initiated by consumers accounted for 16.48 million of all enquiries and enquiries from banks and other financial institutions accounted for 67.5%, enquiries from telecommunication providers accounted for 8.4% and enquiries from retailers accounted for 6.0%.

South Africa has a sophisticated credit bureau system. South Africa is ranked 62 in the world in terms of ease of getting access to credit based on the strength of legal rights and the depth of credit information (World Bank, 2017). On a scale of 0-8, the depth of credit information is seven, indicating high scope and accessibility of credit information distributed by credit bureaus in South Africa. The strength of legal right index is 5 and can be considered as a moderate level. This indicates that the extent to which bankruptcy laws and pledge of collateral are able to protect borrowers and lenders rights and therefore facilitate lending is slightly reasonable in South Africa.

Nevertheless, some enterprises cannot access credit due to lack of information. According to the CBA[6], this is due to challenges such as difficulties in collecting data from the large less formal economy; lack of sharing of trade credit data; lack of sharing of payment performance information on personal loans used for commercial purposes; and lack of sharing of non-financial data such as utility data in commercial environment.

3.4. Trade credit trend in South Africa

Trade credit is one of the major sources of finance in modern economies. Trade credit estimated by accounts payable was approximately 15% of total assets in 1991 for listed US firms (Rajan and Zingales, 1995). This compares to records reported in, Canada, France, Germany, Italy, Japan, and the United Kingdom. Aktas, et al. (2010) report that

[6] See http://www.thedti.gov.za/sme_development/sumit/The%20importance%20of%20the%20credit%20bureau%20to%20the%20development%20and%20gro.pdf accessed 27 January 2017.

trade credit that finances asset of US-listed firms between 1992 and 2007 amounted to close to 10%. This corroborates the findings of this current study. In South Africa, over 2007 to 2015, suppliers financed almost 10% of the total assets of the sample enterprises.

Nonetheless, in South Africa, examinations of access to credit seldom take into account access to and use of trade credit. The most predominant source of credit used by SMEs in most if not all economies is trade credit. Therefore, trade credits' information can serve as an important basis for evaluating risk in small-business loans. Trade credit constitutes the most of SMEs credit files in South Africa. It accounts for at least R24 billion every month in total outstanding credits (Turner et al., 2008). In addition to a signalling role of trade credit to help banks with a basis to measure risk, trade credit data is considered as a tool to help other trade credit suppliers with an opportunity to examine the risk associated with their customer (Turner et al., 2008). It is also possible to use trade credit data as a measure of the potential growth and current capacity of businesses because the trade credit data indicates amounts outstanding over time (Turner et al., 2008).

According to Turner et al (2008), it is not easy to collect trade credit as compared to bank loan data. The reason behind this difficulty although not clear, could be associated with the specifics of the market and the industry experience with reporting trade credit data (Turner et al., 2008). One reason reported in the literature is the fact that trade credit data come from several sources, and often the sources are not equipped to report on their customers and suppliers unless if it is a large firm (Turner et al., 2008).

Table 2 indicates investment and working capital financed by different sources of finance. Close to 10% total assets are financed by trade credit, 29% of current assets is financed by trade credit in South Africa, and contribute 38% of current liabilities. This entails that trade credit is important and is used mostly to finance working capital.

Table 2: Trade credit contribution and financing

Year	Trade credit/Total assets	Trade credit/Current assets	Trade credit/Current liabilities
2007	9.72%	27.69%	32.70%
2008	10.67%	29.14%	35.00%
2009	9.95%	29.95%	35.42%
2010	9.21%	26.26%	34.63%
2011	10.12%	31.39%	40.86%
2012	10.18%	30.38%	40.16%
2013	9.74%	30.00%	40.11%
2014	9.59%	30.22%	39.12%
2015	9.26%	29.95%	39.76%
Average	9.83%	29.44%	37.53%

Source: Author's own computation based on the Bureau Van Dijk (2007-2015) database

3.5. Relationship between trade credit and bank credit

The theories posit that trade credit and bank credit can either be complements or substitutes. Figure 5 illustrates the relationship between trade credit and bank credit in South Africa between 2007 and 2015. Figure 4 indicates total trade credit and bank credit amounts. Creditors represent accounts payable while debtors represent accounts receivable and bank credit is represented by loans. In Figure 5, Tpay (trade credit) is measured by accounts payable (creditors) divided by total assets, Tcrec is measured by accounts receivable (debtors) divided by total assets, Tcnet is measured by accounts receivable minus accounts payable divided by total assets, and bank credit is measured by bank credit divided by total assets.

In Figure 4, the relationship between trade credit and bank credit is clearly positive throughout the period, with some indication of lagged positive relationship between trade payable (creditors) and bank credit (loans). It is interesting that creditors and debtors are also moving in the same direction. This is an indication that when enterprises buy more and delay their payments to their creditors, they are also able to sell more on credit to their debtors.

Figure 5 also indicates a positive relationship between trade credit and bank credit (but not with all trade credit indicators). The relationship between Tpay and Bkloan is positive throughout the period. However, there are instances where Tpay and Bkloan indicate a lagged positive relationship for instance in 2011 and 2012. Tcnet and Bkloan indicate a positive relationship, but it was negative between 2007 and 2008.

Unlike in the study by Lin and Chou (2014), there is no clear or constant relationship during the financial crisis in 2008-2009. Lin and Chou's (2014) study on China indicated a negative relationship during the financial crisis, which supported the theory first developed by Meltzer (1960). Throughout the other periods under Lin and Chou (2014) study, the relationship between trade credit and bank credit was positive, indicating a complementary relationship.

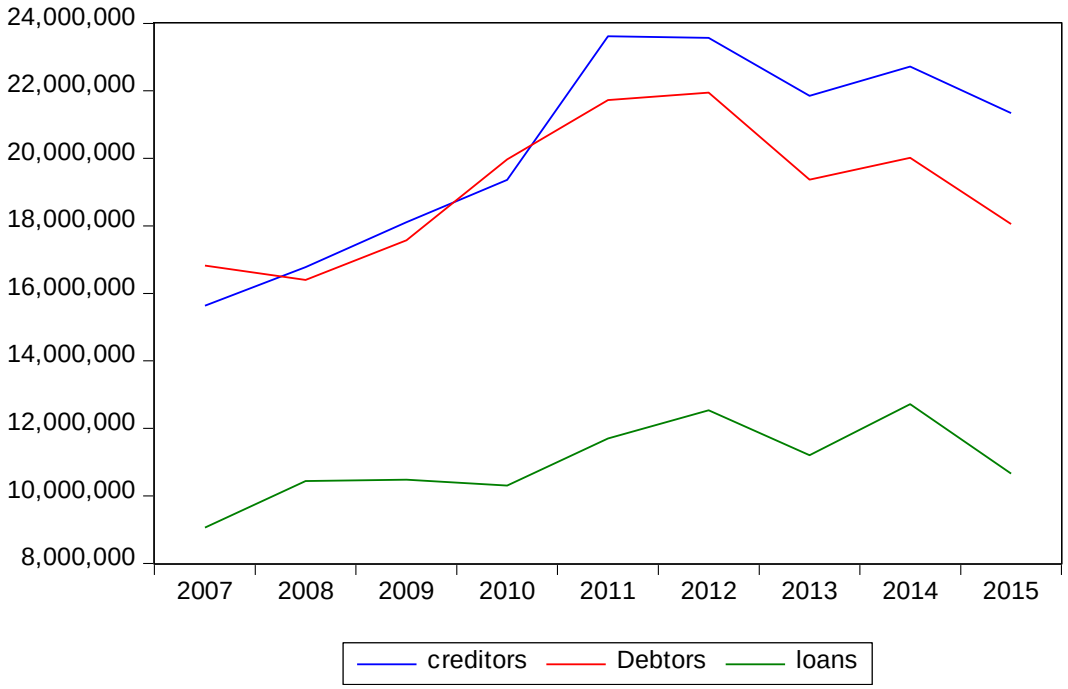

Figure 4: Total loans and trade credit

Source: Author's own computation based on the Bureau Van Dijk (2007-2015) database

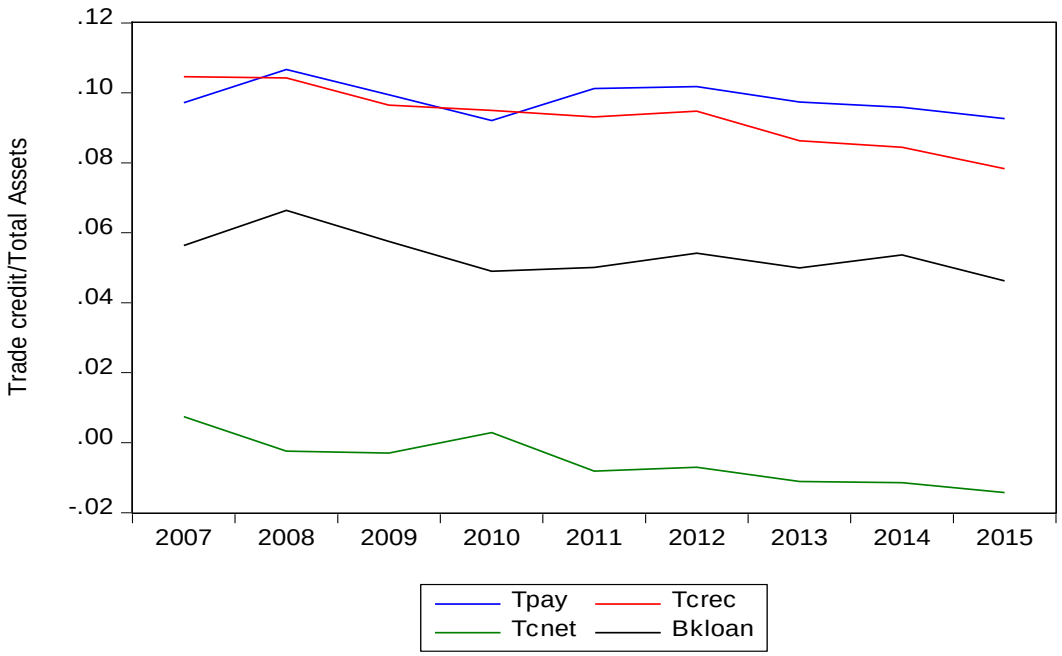

Figure 5: Trade credit/total assets compared to bank credit

Source: Author's own computation based on the Bureau Van Dijk (2007-2015) database

3.6. Conclusion

In this chapter, it was determined that regardless of the level of development in the financial sector, South Africa's financial sector has not met the financial demand of enterprises considered to be of greater credit risk and lack collateral and financial business expertise. The study utilised various quantitative indicators of the financial sector and trade credit use. The analysis suggested that South African financial sector is well-developed.

To determine the role that trade credit can play to ensure access to the most efficient bank financing, trade credit was compared to bank credit. The figures indicated a positive relationship between trade credit and bank credit, which entails that trade credit, has information content that can be used by the banks to analyse credit risk and decrease the information asymmetry. The next chapters provide methodology and empirical evidence to determine if this relationship is statistically significant.

CHAPTER FOUR

METHODOLOGY

4.0. Introduction

Having established in the previous chapters that trade credit plays a critical role in financial intermediation; this chapter now empirically tests the nature of relationship or association between these two variables in South Africa. Internationally, economists have long debated the practical importance and the role that trade credit plays. Some argue that it is a substitute to bank credit, while some are claiming that it is a complement and some providing mixed results (Petersen and Rajan, 1997; Jain, 2001; Burkart and Ellingsen, 2004; Garcia-Appendini, 2011). The challenges remain that in South Africa, the literature discusses the importance of this nexus, but there are no empirical studies available yet to prove these theories in the South African context. Only a few did carry out research on trade credit, but with different objectives (Olawale and Akinwumi, 2010; Kohler and Saville, 2011; Kwenda and Holden, 2014, Otto, 2014). Among the studies that have been carried out in South Africa, only Kwenda and Holden's (2014) study is marginally closer to the objective of this study. Kwenda and Holden (2014) dealt with determinants of trade credit among South African listed firms, Kohler and Saville (2011) dealt with the determinants of access to trade credit by new SMEs in the Eastern Cape Province of South Africa and Olawale, and Akinwumi (2010) focused on trade finance.

This study used the panel-data approach to explore the relationship between trade credit and bank credit using random and fixed effects models. For instance, Lin and Chou (2014) and Tsuruta (2008) used these methods. The issues relating to the choice between random and fixed effects model is also discussed. An empirical illustration is provided in Chapter 5[7]. Instrumental variables procedures or GMM provide interesting alternatives where the introduction of lagged dependent variable does not complicate

[7] the appropriate model will depend on the results of the Hausman test

consistent estimation. In addition, to identify if the results are robust to the estimation technique used the study also uses the Tobit model. These methods are used by many studies (Agostino and Trivieri (2014) and Gama and Mateus (2010), justifications for using these models are explained later in this chapter.

4.1. Methodology

4.1.1. Model specification

The study aims to use an econometric model to identify the association and causal relationship between bank credit and trade credit in South Africa. Basically, the study wishes to evaluate whether trade credit and bank credits are complements or substitutes as suggested by the literature (Smith, 1987; Mian and Smith, 1992; Wilner, 2000; and Giannetti et al., 2008). To test this hypothesis, (based on Lin and Chou's (2014) and Atanasova (2012) study), the model is estimated using the following equation:

$$BkLoan_{it} = a_0 + B_1 Tpay_{it} + B_1 Tpay_{it-1} + B_2 AGE_{it} + B_6 COVERAGE_{it} + B_4 DEPR_{it} + B_7 LEVERAGE_{it} + B_3 SIZE_{it} + \varepsilon_{it} \quad \text{(a)}$$

i and t refer to a firm and time period respectively. Bkloan is a dependent variable. Tpay, age, coverage, depr, leverage, and size, are all independent variables. Tpay is trade credit, age is the age of the firm *i* at time t, coverage is the ability to meet financial obligations (liquidity), depr is depreciable assets indicating collateral, leverage indicates debt level, and size is the size of the firm *i* at time t.

Trade credit is measured by accounts payable. Many studies focusing on whether trade credit facilitates access to bank credit use accounts payable. Accounts payable are liabilities an enterprise owes because it purchased goods or services on credit from a supplier, while accounts receivable are assets an enterprise has a right to collect because it sold goods or services on credit to a customer. On the other hand, bank

credit is also a liability. Hence, the banks would only use information on how well an enterprise paid its creditors, but not how well its customers have paid back their debts.

Bank credit is considered a dependent variable and trade credit an independent variable because the model intends to identify whether trade credit can facilitate access to bank credit. In addition to the substitution role that was determined by the earlier theories of trade credit, the recent and prominent theoretical study such as Biais and Gollier (1997), Burkart and Ellingsen (2004) determined that these sources of finance could be considered as two complementary sources of financing enterprises. This theory posits that the use of trade credit can help to alleviate the credit constraints suffered by financially constrained firms. This theory focuses specifically on the firms that may suffer from imperfect information and the problem of credit rationing. The theory argues that trade credit can provide a signal by revealing supplier's information to the bank. Consequently, banks can be convinced to lend when suppliers also lend to their customers. This study focuses on the informational role of trade credit. The study does so by analysing whether trade credit can contribute to building a reputation for borrowers, or simply examine if the availability of trade credit facilitates access to bank credit.

4.1.2. Measurement of variables and data sources

4.1.2.1. Data sources

The data in this study were obtained from Bureau Van Dijk (Orbis), which covers data from different industries. Bureau Van Dijk covers firms' financial and nonfinancial information and business intelligence for individual countries, regions and the world. The database uses BVB proficiency with renowned information publishers to create information products. The database has widespread coverage of private enterprises, detailed company hierarchies, standardised financial reports such that it is possible to compare financial strength metrics to assess the financial viability of enterprises. It combines 120 sources and covers approximately 150 million firms globally. Nevertheless, this study only utilised South Africa data and only select firms with

available data. This study used the panel data from 2007 to 2015 for 174 firms in South Africa, based on the availability of information from Bureau Van Dijk. The Definition of SMEs in the National Small Business Act is an enterprise with fewer than 100 to 200 employees, depending on Industry Less than R4 million to R50 million turnover and depending upon Industry Less than R2 million to R18 million assets. The study measured size based on turnover and assets. Based on assets, there were 58 large firms and 116 SMEs. The study removed outliers in the highest 99th and lowest 1st percentile because it was not possible to determine if the outliers are bad data.

4.1.2.2. Definition of indicators

The measures of trade credit are usually the same across different studies. In this study, trade credit is measured by the ratio of:

$Accounts\ payables/total\ assets$ (Tpay)

This ratio signifies a firm's dependence on trade credit and provides the percentage of total assets that is financed by trade credit. The data are collected directly from the firms' balance sheet compiled by the Bureau Van Dijk (Orbis). This is similar to the study by Lin and (Chou (2014) Alphonse, Ducret and Severin (2006), Rodriguez-Rodriguez (2006) and Saito and Bandeira (2010). Access to other forms of credit or bank credit is represented by the ratio of $\frac{short\ term\ debt(loan)}{total\ assets}$ (Bkloan).

In determining whether to grant credit, banks look at the age of the firm. The reputation of the firm grows with the firm age. The notion that the provision of finance grows with the age of the firm is a well-established phenomenon in the literature (Berger and Udell, 1998). Hence, a positive relationship between firm age and bank credit is expected. As in the many other studies such as Tsuruta (2008) and Ogawa et al. (2011), the variable age is measured by the natural logarithm of the period that passed between the date that the firms was founded and the year of measurement.

According to Alphonse et al. (2006) and Saito and Bandeira (2010), depreciable assets (DEPR/Total assets) play a collateral role, and banks might require collateral to grant credit. When lenders can observe firms' creditworthiness, low-quality borrowers have to pledge collateral to obtain loans, while high-quality borrowers do not. Hence, (DEPRE/Total Assets) is used as a proxy for the firm's ability to collateralise its debt.

The theory also suggests that a firm is more likely to face credit constraints in different instances. Firstly, credit constraints could occur when a firm's level of profits, assets, and tangibility are low and when its coverage (operating income-to-interest ratio) ratios is low. Secondly, credit constraints could occur when a firm's leverage (DEBT/Total assets) ratio is high (Atanasova, 2007). Coverage is a measure of the firm's ability to meet its financial obligations. Hence, it is expected to be positively related to banks credit. Leverage measures firm's debt level and banks are less willing to offer credit to high leveraged firms. Therefore, coverage and leverage ratios are included in the model.

The study also includes the firm level variable that is crucial and is used by almost all trade credit studies; this is firm size. The more the assets a firm has, the more likely they would receive credit from the bank. For instance, Demirgüç-Kunt and Maksimovic (1999), Demirgüç-Kunt and Maksimovic (2001), and Li (2011) all use firm size as an independent variable. There are different proxies for firm size; total assets, total sales, and market capitalisation are the most prominent areas in empirical corporate finance research[8]. Hence, this study uses the natural logarithm of total assets and total sales as the measures of firm size.

4.2. Methods and hypothesis testing

This study intends to evaluate whether trade credit plays a signalling role for financial institutions as suggested by the literature (Petersen and Rajan 1997; Jain 2001; Burkart and Ellingsen 2004; Garcia-Appendini 2011). As suggested by these literatures, and on the literature of lending relationships if ever trade credit facilitates access to bank credit,

[8] See http://extranet.sioe.org/uploads/isnie2015/li_dang.pdf. Accessed 30 January 2006

then trade credit (Tpay) should have a positive relationship with the amount of bank credit (B$kLoan$). If trade credit has information content for the banks, the direction of causality should be such that trade credit causes bank credit.

Alternatively, trade credit does not have information content. Hence, trade credit and bank credit are substitutes. The study first provides pooled, fixed and random effect model results to test for this. The Hausman test determines the selection between these methods.

4.2.1. The pooled panel data model

The pooled panel data model assumes that the intercept/constant values of all the firms are the same. It also assumes that the slope coefficients are identical for all the firms. Practically, the pooled panel data method implies that there are no differences between the estimated cross-sections and it is useful under the hypothesis that the data set is *a* "*priori* homogeneous" (Asteriou and Hall, 2007). However, this is restrictive and according to Asteriou and Hall (2007), cases of more interest would include and use fixed and random effects in the method of estimation.

4.2.2. Fixed effect model

The fixed effects model can be defined as a linear regression model with the intercept that differs across the individual unit (Verbeek, 2004) i, i.e.

$$Y_{it} = a_i + x_{it}\beta + \varepsilon_{it}\,.\,\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2) \quad \text{(b)}$$

The method assumes that the value of x_{it} are independent of all ε_{it}. writing this in the usual regression framework by adding a dummy variable for each unit i in the model would give the following;

$$Y_{it} = \sum_{j=1}^{N} a_j\, d_{ij} + x'_{it}\beta + \varepsilon_{it} \quad \text{(c)}$$

Where the dummy variable $d_{ij} = 1$ if $i = j$ and 0 elsewhere. Thus, the model has a set of N dummy variables. OLS can be used to estimate the parameters $a_1 - a_N$ α and β. In

fixed effect model, the implied estimator for β is called the least squares dummy variable (LSDV) estimator.

The assumption that needs to be made is that all values of x_{it} are independent of all ε_{it} . The fixed effects estimator can be shown to be unbiased for β (Verbeek, 2004). If, in addition, normality of ε_{it} is imposed, βˆ Fixed effect has a normal distribution. For reliability, it is vital that

$$E\{(x_{it} - \bar{x}_i)\varepsilon_{it}\} = 0 \qquad \text{(d)}$$

Sufficient for this is that x_{it} is uncorrelated with ε_{it} and that $\bar{x}_i$ does not correlate with the error term. In turn, this is implied by

$$E\{x_{it}\,\varepsilon_{it}\} = 0 \; for \; all \; i, t, \qquad \text{(e)}$$

In which case X_{it} is considered or assumed to be a strictly exogenous variable. Hence, the value of X_{it} should not depend on the past, current and future values of the error term. In some instances, this assumption can be very restrictive. This condition excludes lagged dependent variables in X_{it} , but any X_{it} variable that depends upon the history of Y_{it} would also violate the condition (Verbeek, 2004)[9].

4.2.3. Random effects model

The random effects model is considered as an alternative method of estimating this model. It is commonly assumed that a random error term can summarise the factors that have an effect on the dependent variable but not included as independent variables in the model. This leads to the hypothesis that the a_i are the random factors that are independently and identically distributed over individuals (Verbeek, 2004). Therefore, the random effects model can be written as

$$y_{it} = \mu + x'_{it}\beta + a_i + \varepsilon_{it}\,, \varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2);\; a_i \sim IID(0, \sigma_a^2) \qquad \text{(f)}$$

Where $a_i + \varepsilon_{it}$ represent an error term which consists of an individual specific component (does not differ over the period), and a remainder component (assumed not

[9] https://thenigerianprofessionalaccountant.files.wordpress.com/2013/04/modern-econometrics.pdf

to correlate over the period). This simply means that the correlation between all the error terms over the period is ascribed to the individual effects a_i. It is assumed that a_i and ε_{it} are jointly independent and independent of x_{js}. This suggests that the OLS estimator for μ and β, is not considered to be a biased and consistent estimation (Verbeek, 2004). The error components structure suggests that the composite error term $a_i + \varepsilon_{it}$ indicate some level of autocorrelation (unless $\sigma_a^2 = 0$). Thus, the standard errors for the OLS estimator are inappropriate. It is therefore necessary to consider a supplementary efficient generalised least squares (GLS) estimator that can be achieved by exploiting the structure of the error covariance matrix (Verbeek, 2004).

4.2.4. Fixed Effects or Random Effects

Choosing between the fixed effects and random effects methods comprises of examining whether the independent variables are correlated with an individual effect. The fixed effects method depends on the values for a_i. The fixed effect considers the distribution of y_{it} given a_i, where the a_i can be estimated. According to Verbeek (2004), this explanation is most appropriate when i denote large number of countries, firms or industries, and the estimates needed are for a specific country, firm or industry. Inferences will thus be with respect to the effects that are in the sample firms of the study.

As opposed to the fixed effect, the random effects approach does not depend on the individual $a_i\, s$, but integrates the individual $a_i s$. Therefore, the concern is not on individuals a_i but focus on random individuals that have definite characteristics.

The random effects model can allow the study to interpret the results with respect to the characteristics of the population. Hence, the random effects model states that

$$E\{y_{it}\,/x_{it}\} = x'_{it}\beta \qquad \text{(g)}$$

While the fixed effects model estimates

$$E\{y_{it}\,/x_{it}\,, a_i\} = x'_{it}\beta + a_i, \qquad \text{(h)}$$

The β coefficients in these two estimates are the same only in cases where $E\{a_{it}/x_{it}\}=0$. In summary, a first motive for choosing the fixed effects model above is that some interest may lie in a_i, which may only be logical if the number of units is to a certain extent small and of a definite nature. That is, when it is important to identify individual units. However, according to Verbeek (2004), it is possible for the fixed effects estimator to be preferred where the interest lies in the large population of individual units, although random effects estimators may seem appropriate. This is possible in the cases where a_i and x_{it} are correlated, and the random effects model, ignoring the correlation as mentioned, may lead to unreliable estimators. The issue where individual effects ,a_i and the explanatory variables in x_{it} are correlated can be controlled by means of the fixed effects model, which in effect disregard the,a_i from the model, and thus disregards any problems that they may cause.

Nevertheless, Hausman (1978) proposed a test under the null hypothesis that x_{it} and a_i are not correlated. The overall notion of a Hausman test is to compare random and fixed effects estimators. One of the estimators (random or fixed effect) is reliable under both the null and alternative hypothesis and one that is only reliable under the null hypothesis. If there is a significant difference between the two estimators, the null hypothesis is not likely to hold. Hausman (1978) modified the test constructed on the idea that under the hypothesis of no correlation, both OLS and GLS are reliable but OLS is not consistent while under the alternative OLS is consistent.

The Hausman test statistic cab be estimated as

$$\xi_H = \left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right)' \left[\hat{V}\{\hat{\beta}_{FE}\} - \hat{V}\{\hat{\beta}_{RE}\}\right]^{-1}\left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right), \qquad \text{(i)}$$

The $\hat{V}$ denotes estimation of the true covariance conditions. Under the null hypothesis, chi-statistic ξ_H has an asymptotic Chi-squared distribution with K df, K is the number of elements in β. The null hypothesis implicitly declares that $\lim\left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right)=0$. Therefore, the main aim of the Hausman test is to test whether the random effects and fixed effects estimator are significantly different. These two estimators can only be different if there is

correlation betweenx_{it} and a_i. According to Verbeek (2004), other sorts of misspecification may also read to rejection.

4.3. The stationarity test

The models above did not take the time series nature of the data into account and this might affect the quality of the results obtained using these models. To overcome this problem, the study subjects the variables to some time series test and uses panel time series techniques for estimation. The behaviour and properties of a series can be influenced significantly by stationarity. If two variables are trending over the period or if the regression is spurious, the regression could have a high R^2 even if the variables are unrelated. If the test is performed and the variables in the regression model are discovered to be not stationary, it would serve as a proof that the standard assumptions for asymptotic analysis may not be valid. Specifically, the usual "t-ratios" would not follow a t-distribution if the series are not stationary. Hence, the study cannot reliably accept hypothesis tests about the regression parameters. In this study, the variable size across firms is likely to exhibit changing means and/or trends over time.

Recent literatures have emphasised that the panel unit roots' tests are better than univariate tests. A stationary series is integrated of order (d) if it is stationary after being differenced (d) times. Models with non-stationary variables are high likely to produce spurious regressions and provide unreliable test statistics. It can, however, be differenced appropriately, such that a non-stationary variable can transform and be a stationary variable (Harris and Sollis, 2003). The suitable number of differencing a non-stationary variable is called the order of integration.

Levin and Lin (1993) proposed the foundations for panel unit root tests. Now the most common panel stationary tests are Levin-Lin (LL), Im-Pesaran-Shin) (IPS) and Maddala-Wu[10]. For firms, heterogeneity could arise because of the dissimilarities of the firm's management and the degree of development of each firm. Therefore, this study employs two different, panel unit root tests to determine if the variables in the model are

[10] See http://spot.colorado.edu/~mcnownr/working_papers/panel-unit-root-tests.pdf

stationary or non-stationary. The tests used in this study are Im, Pesaran, and Shin (IPS, 2003) test and Fisher Augmented Dickey–Fuller (Choi, 2001) test. Im, Pesaran and Shin and Fisher Augmented Dickey–Fuller tests reflect heterogeneity using individual effects and individual linear trends.

The importance of using two different stationarity tests is to ensure that the model is estimated in non-volatile form and also to avoid tests with low power issue (Agu and Okechukwu, 2008). Choi (2001) considers the model:

$$Y_{it} = d_{it} + X_{it}\ (i = 1, \ldots N; t = 1, \ldots . Ti) \quad \text{(j)}$$

where $d_{it} = \beta_{i0} + \beta_{i1} \ldots . + \beta_{imi} t^{mi}, x_{it} = a_i x_{i(t-1)} + u_{it}$ and u_{it} is integrated of order zero (Agu and Okechukwu, 2008). Fisher Augmented Dickey–Fuller tests let each time series Y_{it}, have a different sample size. Fisher Augmented Dickey–Fuller test also allows a different specification of non-stochastic and stochastic components depending on i. The null hypothesis of this test is that individual series are non-stationary; the alternative hypothesis is that some of the time series are stationary.

IPS (2003) established a unit root test for dynamic heterogeneous panel data model that is based on the mean of the individual unit root statistics. Furthermore, they proposed a standardised T-bar test constructed from the ADF statistics averaged over the cross-section. The stochastic process Y_{it} is determined by the first-order autoregressive process (Agu and Okechukwu, 2008).

$$Y_{it} = (1 - \phi_i) + \mu_i + \phi_i Y_{i,t-1} + \varepsilon_{it} \quad \text{(k)}$$

The values of Y_{i0} , are given. The null hypothesis of the test, in the equation above can be expressed:

$$\Delta Y_{it} = a_i + \beta_i y_{i,t-1} + \varepsilon_{it} \quad \text{(l)}$$

The null hypothesis is that each individual series in the panel has a unit root. Conversely, the alternative hypothesis allows for a_i to differ across the groups. Hence,

in both tests, if the study accepts the null hypothesis, the relevant series is not stationary against the alternative hypothesis that the series is stationary.

4.4. The co-integration test

The major purpose of conducting a panel co-integration test is to identify if there is any long-term correlation between variables. Besides that, co-integration can be utilised to test for the spurious regression that may emanate from the non-stationary series. For panel co-integration test, several procedures can be used starting from the basis of the traditional Johansen maximum likelihood approach to Engle-Granger approach.

4.2.1. Engle-Granger approach

Two panel co-integration tests have been established under the Engle and Granger (1987). These consist of Kao (1999) test and Pedroni (2000) test. The Kao test is based on the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) methods. This test determines the stationarity of residuals as a way to evaluate if there is a co-integration relationship. However, the Kao test has restrictive assumptions. The Kao test assumes that co-integration vector and coefficients are homogeneous. Several multiple independent variables are not permissible in the co-integration vector and it caters for a single unique co-integration relationship.

The Pedroni test is superior compared to the Kao test because it relaxes several assumptions that the Kao test possesses. Pedroni test allows the co-integration vector to differ across units of the panel. It also allows error terms across the groups to have the heterogeneity effects. Moreover, the test includes several variables in the co-integration vector and control for the endogeneity bias in the OLS.

Pedroni (1997; 1999) established a panel co-integration method that is residual-based. This test allows individual effects, slope coefficients and individual linear trends to be more heterogeneous across the cross-section. Pedroni (2004) considered the following:

$$Y_{it} = a_i + \delta_i + \beta_i X_{it} + \varepsilon_{it} \quad \text{(m)}$$

The test assumes that Y_{it} and X_{it} are integrated I (1) and the factors a_i and δ_i do not discriminate the possibility of individual effects and individual linear trends. β_i coefficient is allowed to differ between different individuals. Therefore, the co-integrating vectors may be unrelated across the firms in the panel.

Pedroni (1999) has also determined the small sample performances of seven measurements to test panel data co-integration by deriving the asymptotic distributions. The first four Pedroni test statistics are based on pooling the "within" measurement consisting of panel-parametric (adf) statistics, panel non-parametric (pp), panel-rho, and panel-v. The last three Pedroni test statistics are based on the "between" measurement; consisting of group-adf statistics, group-pp and group-rho. The null hypothesis for these test is $H_0 : \hat{a}_i = 1$ and the alternative hypotheses are $H_1 : \hat{a}_i = \hat{a} < 1$ $H_1 : \hat{a} < 1$ and for the first four tests and the last three tests, respectively. Having done the stationarity test, the study will also utilise the Tobit model followed by the GMM method as explained below.

4.5. Tobit method

James Tobin (1958) proposed the Tobit model. The method was constructed as an extension of the probit model. It can be used to describe the association between a dependent variable that does not have any negative value and an independent variable. If the information on the dependent variable is available only for some observations in the sample, it is known as a censored sample. Therefore, the Tobit model is also called a censored regression model. Censoring arises when some information on the dependent variable is lost but not on the independent variables. According to Verbeek (2004), it is possible for the dependent variable to be continuous but may have a constrained range probably if the dependent variable equals to zero for a considerable portion of the population but positive for the remaining portion of the population. This can be given by the following:

$$y = y^* \; if \; y^* > 0 \quad \text{(n)}$$

$$y = 0 \; if \; y^* \leq 0 \quad \textit{(o)}$$

Therefore, for instance, if a firm decides to borrow a negative amount y^*, it automatically borrow nothing from the bank. This gives the standard Tobit model, which can be estimated as follows:

$$y_i^* = x'_i\beta + \varepsilon_i \qquad \text{(p)}$$

$$y_i = y_i^* \ if \ y_i^* > 0 \quad \text{(q)}$$

$$y_i = 0 \ if \ y_i^* \leq 0 \quad \textit{(r)}$$

The model that assumes ε_i to be *NID(*0, σ^2*)* and it is independent of x_i. This is a standard regression model, where all the negative values are recorded as zeros.

The Tobit model utilises all the information, including information on censoring and provides consistent estimates. It is estimated using Maximum Likelihood (ML) estimation techniques. James Heckman proposed an alternative to the ML method. It is more probable for the Heckman (1976) procedure to yield consistent estimates of the parameters of the equation above, but they are not as efficient as the ML estimates (Gujarati, 2004). Moreover, most modern statistical software packages have the ML routine (including eviews); hence, this study used the ML estimation technique.

The Tobit regression is proposed for a dependent variable censored either at the lower end or at the upper end of its distribution or both. Censoring is essentially a problem of floor and ceiling effects. This study uses a Tobit model because the dependent variable is censored at zero. It is either a firm has a bank credit or not it cannot be negative (bank credit is censored at the lower end). Hence, Tobit method is appropriate to run this model.

There are a number of ways to interpret coefficients in the Tobit model. For instance, the odds of a zero outcome in the Tobit model is described as

$$p\{y_i = 0\} = 1 - \phi(x'_i\beta / \sigma) \quad \textit{(s)}$$

This means the interpretation of *β/σ* can determine the marginal effect of a change in x_{ik} on the probability of observing zero outcomes. That is,

$$\frac{\partial P\{y_i=0\}}{\partial x_{ik}} = \phi(x'_i\beta/\sigma)\frac{\beta_k}{\sigma} \qquad \text{(t)}$$

Moreover, the Tobit model estimates the expected value of y_i given that it has a positive value. This indicates that the marginal effect of a change in x_{ik} on the value of y_i , given the censoring is different from β_k (Verbeek, 2004) . Hence, it follows that the expected value of y_i is given by

$$E\{y_i = x'_i\beta\ \Phi(x'_i\beta/\sigma) + \sigma\phi(x'_i\beta/\sigma) \quad \text{(u)}$$

Therefore, the marginal effect on the expected value of y_i of a change in x_{ik} is given by

$$\frac{\partial E\{y_i\}}{\partial x_{ik}}\beta_k\ \Phi(x'_i\beta/\sigma). \qquad \text{(v)}$$

This indicates that the marginal effect of a change in x_{ik} is given by the coefficient multiplied by the probability of having a positive outcome. Therefore, if the probability is equals to 1 for a particular cross-section, the marginal effect is the same as β_k similar to the linear model. Lastly, the marginal effect on the latent variable is easily obtained as

$$\frac{\partial E\{y_i^*\}}{\partial x_{ik}} = \beta_k \qquad \textit{(w)}$$

4.6. GMM method

Hansen (1982) was the first to make GMM estimation formal. GMM has become one of the most used methods of estimation. Unlike the Maximum Likelihood (ML) estimation, GMM relaxes the requirement to have a full knowledge of the distribution of the data. The GMM method estimations are directly from the moment conditions that are in the model. The GMM estimator is based on general characteristics of the population, as is the case in the classical likelihood-based framework.

GMM requires fewer and weaker assumptions compared to the classical likelihood-based framework. In order to provide an objective function, GMM only makes assumptions about the moments of the random variables. The moments of the random

variables are known as the population moments. The data provide the sample moments. Hence, GMM minimises the objective function to select the parameters that yield the smallest differences between the population moments and the sample moments (Casey and O'Toole, 2014).

The relationship between trade credit and bank credit may be a correlation running from bank credit to trade credit or a reverse correlation, and previous bank credit affects the probability of getting bank credit in the current period. Therefore, bank credit is potentially endogenous, which may lead to inconsistent estimations of the model. To identify the relationship between trade credit and bank credit correctly and deal with the endogeneity problem, the study exploits the panel nature of the data used in this study and includes the lagged values of the bank credit in the analysis. To address the potential problem of reverse causality the study used GMM model, which makes it possible to control for endogeneity by using instruments (Casey and O'Toole, 2014). The study first utilised the estimation strategy that was proposed by Arellano and Bond (1991). In addition, Arellano and Bond (1991) proposed the use of all the explanatory variables lagged as instruments. Their method assumes that there is no second-order serial correlation in the errors in first differences.

However, if some value of Y_{it} is missing, then both ΔY_{it} and ΔY_{it-1} will be missing when the data are transformed using Arellano and Bond's (1991) approach. Therefore, it is necessary to use the alternative transformation proposed by Arellano and Bover (1995) which is called orthogonal deviations transformation. In contrast to first difference transformation that subtracts previous period value from the present period value, the orthogonal deviations transformation subtracts the average of all observations from the present value. Orthogonal deviations are computable for all periods except the last period, even in the presence of gaps in the panel. All explanatory variables are used as instruments.

Another estimation problem may come from the fact that the relationship between bank credit and trade credit may not always be the possibility of correlation that may run from bank credit to trade credit or a reverse correlation. Nevertheless, a spurious relationship

or correlation may be attributed to unobservable individual heterogeneity among firms. By using panel data, the endogeneity caused by a spurious relationship can be solved.

4.7. Conclusion

The main objective of this chapter was to determine the methodology and the set of data that this study used. This study has used the panel-data approach to explore the relationship between trade credit and bank credit using a fixed effects model/random effect model. Lin and Chou (2014) employed this method as it is more recent and capture more information than many other previous studies. The study further used Tobit and GMM methods.

CHAPTER FIVE

FINDINGS

5.0. Introduction

Chapter 4 has set the analytical framework and the model estimation technique used in this study in order to analyse the association between trade credit and bank credit in South Africa. This chapter applies the model developed in the previous chapter and the other techniques that were discussed. The results from this chapter are used to address the objectives set out in the first chapter. The results presented include those of unit root, the results of pooled data, fixed and random effect model and determination of which method is more appropriate are presented in the first section. After determining the most suitable method, discussion of the association between trade credit and bank credit is highlighted in section two. Moreover, to identify if the results are robust, the study tests the model using other measures of some variables and the Tobit and GMM methods. By doing this, the study determines whether the results provide the same conclusion about the correlation between trade credit and bank credit or not.

5.1. Stationarity/Unit root test results

In this study, one informal test for stationarity and two formal tests are employed. The study first utilises the graphical analysis of the series. This is a graphic plot of the series. It is an essential step to show a graphical analysis before pursuing any formal tests. It is possible to detect any data capturing errors and structural breaks and gives an idea of the trends and stationarity of the data set before performing a formal test. The figures in the appendix display plots of all variables considered for the model.

All variables except for Coverage could be stationary or closer as they seem to be moving around their means and indicate constant variances over time but some variables are not so clear. A conclusion can be reached that these variables are stationary in levels, that is, they are integrated of order zero based on the graphical

analysis. Size variable seems to be trending downward. However, it is important to perform a formal test, as it is required to ensure the stationarity status of the variables, especially for the variables that are not following a clear trend.

Fisher Augmented Dickey–Fuller and the Im, Pesaran, and Shin (IPS) test are applied to examine the stationary properties of the series. The null hypothesis of the all the tests is that the series has a unit root.

Table 3: Panel unit root test

Variables	Fisher ADF	IPS
	Levels	**Levels**
BKLOAN	585.467***	-8.54741***
TPAY	668.230***	-9.04153***
AGE	2333.35***	-254.866***
COVERAGE	883.001***	-31.6967***
DEPR	577.171***	-13.7703***
LEVERAGE	563.098***	-65.4680***
SIZE	522.605***	-20.0301***

***** And indicate significance at the 1% level.**

Source: Author's own computation based on the Bureau Van Dijk (2007-2015) database

Table 3 indicates the results of the panel unit root tests for the order of panel integration. The lags are based on Schwarz information criterion from Eviews. This assumes that the null hypothesis of each individual series is non-stationary.

Both Im, Pesaran and Shin test and Fisher Augmented Dickey–Fuller test provides the same results. The null hypothesis of the unit roots is strongly rejected at the 1% significance level at all levels. All results from the panel integration suggest that it is not necessary to do a co-integration test and the panel relationship can be examined within a time stationary framework.

5.2. Results

Table 4 indicates the results from the five methods and table 5 indicates the results from three applicable methods using the lagged trade credit as a variable of interest. When examining the results of the pooled regression, it can be identified that all the coefficients are individually statistically significant. Bkloan is negatively related to Tpay. The explanation for disregarding the results of the pooled regression model is in the appendix. When examining the results of fixed effect model, it can be noted that all the coefficients except for Coverage and Size are individually statistically significant. The Random effect model provides results where, Tpay, Age, Coverage and Size coefficients are not statistically significant. Although some variables are not individually significant, they are jointly significant when implementing an F-test. Before explaining the result, it is important to determine the preferable model between random and fixed effect model.

Table 4: Regression results

Variables	Pooled data		Fixed Effect		Random effect		Tobit			GMM	
	Bkloan		Bkloan		Bkloan		Bkloan			Bkloan	
							Coefficient	Marginal effect			
Constant	0.084020	***	0.058923		0.115333	***	0.070407		0.062687	0.024985	***		
	(0.000608)		(0.056418)		(0.048453)		(0.031894)	**	(0.018933)				
Bkloan(-1)												0.209433	
												(0.026433)	
Tpay	0.035915	***	-0.075982	**	-0.104342	***	-0.035706		0.057074	0.022748	***	-0.075849	**
	(0.000653)		(0.033811)		(0.033539)		(0.026592)		(0.020396)			(0.037332)	
Age	0.000362	***	0.012364	**	0.006275		0.006124		-0.001099	-.000438		0.012387	**
	(8.74E-05)		(0.005832)		(0.005970)		(0.004035)		(0.002730)			(0.006544)	
Coverage	-1.90E-07	***	9.10E-09				-1.84E-08		-2.46E-05	-.804953	*	-7.78E-07	
	(8.22E-09)		(1.58E-07)				(1.57E-07)		(1.39E-05)			(2.87E-06)	
Quick					0.006418	***							
					(0.001114)								
Depr	0.041226	***	0.160364	***	0.125689	***	0.146314	***	0.053763	0.021428		0.139285	***
	(0.001949)		(0.049271)		(0.049166)		(0.047084)		(0.060321)			(0.045929)	
Leverage	0.020637	***	-0.148405	***	-0.153816	***	-0.116246	***	0.036999	0.014746	*	-0.135827	***
	(0.000682)		(0.020564)		0.019831		(0.019022)		(0.021259)			(0.020066)	
Size	-0.002273	***	-0.001019				-0.001084		-0.001130	-.000450		0.004245	
	(5.14E-05)		(0.004462)				(0.002598)		(0.001605)			(0.004701)	
SizeS					-0.002741								
					(0.003752)								
ADJ-R2	0.007464		0.568528				0.111443						
F*J stats	1088.725	***	12.11279	***			0.036979	***				14.57733	

Hausman						31.157777	***			
obs	1148		1148			1137		1148		894

***, **,* means statistically significant at 1%, 5% and 10% levels and Standard Error in parentheses

Source: Author's own computation based on the Bureau Van Dijk (2007-2015) database

Table 5: Lagged trade credit results

Variables	Fixed Effect		Tobit			GMM	
	Bkloan		**Bkloan**			**Bkloan**	
			Coefficient	Marginal effect			
Constant	0.081870	***	0.090256	0.035997	***		
	(0.017934)		(0.020870)				
Bkloan(-1)						0.208791	***
Tpay(-2)	0.015106	*	0.086588	0.034534	***	0.041680	
	(0.008910)		(0.021769)			(0.034158)	
Age	0.001013		-0.004161	-0.001659		0.015502	*
	(0.002691)		(0.003203)			(0.008578)	
Coverage	-5.06E-07		-2.51E-05	-1.001076	*	-9.95E-07	
	(5.66E-07)		(1.47E-05)			(2.89E-06)	
Depr	0.039067	**	0.031573	0.012592		0.126960	**
	(0.019721)		(0.068151)			(0.056637)	
Leverage	-0.079320	***	0.071792	0.028633	*	-0.112515	
	(0.011150)		(0.023894)			(0.022467)	***
Size	-0.001226		-0.002987	-0.001191		0.003030	
	(0.001099)		(0.001749)			(0.005257)	
ADJ-R2	0.568528						
F*J stats	12.11279	***				9.91E-30	
obs	1148		899			766	

***, **,* means statistically significant at 1%, 5% and 10% levels and Standard Error in parentheses

Source: Author's own computation based on the Bureau Van Dijk (2007-2015) database

In most cases, when the panel is balanced, it might be expected that the fixed effects model is consistent (Ranjan and Agrawal, 2011). Random effects model may be more suitable where the sample encompasses limited observations of the existing cross-sectional units. The Hausman test was proposed to determine the suitable approach between the fixed effects and random effects methods.

The Hausman test assumes that if the error terms are correlated with each other, then Fixed Effect is not suitable since assumptions may not be correct and then the study would need to be reliant on random effects results. Hausman test is a technique that is used to distinguish between fixed effects model and random effects model in the panel data. The Random effects model is desirable under the null hypothesis due to the probability of greater efficiency, under the alternative hypothesis, the fixed effects model is suitable and thus preferred. According to Hausman and Taylor (1981), any rejection of the null hypothesis also suggests that the fixed effects and random effects model are different and, hence, that the fixed effects should be preferred over the random effects.

The result of the standard Hausman test reported in Table 4 indicates the “orthogonality hypothesis” of the unobservable individual specific effects, and the study rejects the null hypotheses that the Random effect model is preferable.

The study also employs Tobit model. The findings are provided in the next section. In the context of panel data used in this study, there is a need to deal with unobserved heterogeneity. This can be done by applying the within transformation, as it was done in this study by using the one-way fixed effects models. T can also be done by taking first differences. The ability of first differencing to eliminate unobserved heterogeneity motivates the family of estimators that have been developed for dynamic panel data models. These models contain one or more lagged dependent variables. Hence, this study further used GMM model and the explanation of which was provided under Chapter 4.

5.3. Findings: fixed effect, Tobit, and GMM model

According to Teixeira (2008), in many instances, banks may avoid the fixed cost involved in screening and monitoring some enterprises. In analysing the results presented in Table 4, the study observes that the variable trade credit (Tpay) borne a negative sign and is significantly related to bank credit (Bkloan) for South African firms using both fixed effect and GMM model. Both models confirm a statistical significance at 5% level. This indicates a substitute relationship between bank credit and trade credit consistent with Molina and Preve (2012), and Atanasova (2007) studies. Tobit model provides different results, where Tpay has a positive sign and significant at 1% level. This indicates a complementary relationship, which is consistent with Psillaki and Eleftheriou (2014) that provided empirical support for the redistribution and signalling role or motive of trade credit. The change on the sign of the coefficient indicates that the model is not robust to estimation technique used.

As expected, firm's age has a positive sign and the relationship between variable age and Bkloan is statistically significant at 5% level using both fixed effect and GMM model. This confirms a priori expectation that the older the firm, the better the prospect to get bank credit. It is usually the case that the longer the firm exists, the more it can create a good or a bad reputation. This result is consistent to Atanasova (2007) and Cuñat (2007) findings.

Also meeting the priori expectation and consistent with Alphonse et al. (2006) and Saito and Bandeira (2010) is the variable Depr. Alphonse et al. (2006) and Saito and Bandeira (2010) stated that banks might require collateral to grant credit. Collateral is another means to overcome information asymmetries to prevent asset substitution from firms and credit rationing from banks. The variable Depr is positive and statistically significant at 1% level using fixed and GMM model. Tobit model provides a positive relationship between Depr and Bkloan, but not of statistical significance.

Unlike collateral, the liquidity is a direct measure of a firm's ability to meet its financial obligations. All measures of liquidity (coverage and quick) have positive signs but coverage is not statistically significant. This conforms to a priori expectations that the

higher the coverage, the more likely the firm is to get a bank credit. This suggests that the coverage has an impact on the Bkloan although the effect is not large enough to produce a statistically significant impact when using the fixed effect and GMM model. However, using the Tobit model, the positive relationship between Coverage and Bkloan is statistically significant at 10% level. This is consistent with Atanasova (2007).

Leverage is also an important measure to determine if the enterprise is credit worthy. The more indebted the firm, the less likely it can access bank credit. Consistent with Atanasova (2007), this is indicated by a negative relationship between Leverage and Bkloan. This is only true when using the fixed effect and GMM model, which provided negative and statistically significant results at 1% level. On the other hand, Tobit model provides a positive sign significant at 10% level.

Of the sample enterprises, all the measures of size (assets and sales) have negative signs and are not significant in all three models. The sign is, however, positive under the GMM model. Although the priori expectation was that the bigger the firm, the better the prospect to get bank credit, the negative relationship is consistent with Gama and Mateus (2010). However, these impacts are not large enough to provide statistically significant results.

The model was re-estimated using the lagged Tpay using fixed effect, GMM and Tobit methods. The lagged Tpay is positively related to Bkloan when using all methods. This indicates that, when using lagged trade credit as a variable of interest, the model becomes robust to estimation techniques used. This result supports the findings made by Teixeira (2008). From the results obtained for the variable lagged Tpay, the study could argue that trade credit can be used as a way to signal the firm's quality, as suggested by Biais and Gollier (1997). This can help enterprises build a good reputation and borrow at low cost. Hence, trade credit can reveal the private information of the supplier to the banks, and mitigate the information asymmetry. In turn, this can update banks beliefs about the customer default risk (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). This finding is consistent with Gama and Mateus' (2010) study.

As it can be observed, the results from GMM models are comparable to that of fixed effect model. Tobit model provides different finding from the other models and also provide a positive relationship between current values of Tpay and Bkloan, indication that this model is not robust to estimation technique. In contrast, all models provide a positive relationship between previous values of Tpay and current values of Bkloan, confirming that, trade credit reveals the private information of the supplier to the banks and provides signals for creditworthiness. In addition, the dynamic nature of GMM model provided that the previous bank credit affects the probability of getting bank credit in the current period. The lagged Bkloan is positive and statistically significant at 1% level. In addition, tests were done to check the robustness of the findings of the study using the alternative way of measuring some variable; this is discussed in the appendix.

5.4. Conclusion

Throughout this chapter, the main objective was to verify the association between trade (Tpay) credit and bank credit (Bkloan) in South Africa. Before performing this investigation, this study first tests the stationarity. The null hypothesis of the unit roots was strongly rejected at the 1% significance level at all levels. All results from the panel integration suggested that the panel relationship could be examined within a time stationary framework.

The study used five different methods and interpreted three of them to identify whether these three approaches are compatible with each other or not. Using the fixed effect and GMM models, it was identified that trade credit is negatively related to bank credit; hence, it can be concluded that bank loan and trade credit are substitutes in South Africa. Nevertheless, Tobit model provided a positive relationship indicating that the model is not robust to estimation techniques used.

Nevertheless, the lagged trade credit is positively related to bank credit using all three methods, indicating that trade credit information facilitates bank credit. This model as indicated in table 5 is robust to estimation techniques. To sum up, some enterprises may be credit rationed by banks and may have to use trade credit as a source of external finance. After a while, trade credit data enable firms to build their reputation.

The firm can then be considered as high-quality borrowers and start to gain access to bank credit.

In that context, it is, therefore, possible for trade credit to play the signalling role of borrower quality to uninformed banks. Depending on the situation of the enterprise, trade credit and bank credit can then be considered as substitutes using the current trade credit and complementary sources of finance using the previous trade credit. Although some variables are not individually significant, they are jointly significant when implementing an F-test. However, just like Kwenda and Holden (2014), the use annual financial statements, as the main source of data is the main limitation of this study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0. Introduction

This chapter provides the conclusion about the research question and puts forward policy recommendations and suggestions for future research. Trade credit theories have stimulated research on identifying whether trade credit is a substitute or is complementary to bank credit. The theories and empirical evidence in Chapter 2 indicated that trade credit plays a role in financial intermediation. Most of the earlier theories and empirical evidence supported the contention that trade credit and bank credit are substitutes. On the other hand, recent studies indicate that trade credit and bank credit are complimentary. The complementary role can be either in a form of redistributive hypothesis or signalling role of trade credit. The complementary role that is most supported in the recent studies is the signalling role of trade credit.

The first objective of the study was to analyse the lending condition in South Africa. The analysis in Chapter 3 suggests that the South African financial sector and credit bureaus are well-developed. However, it was identified that regardless of the level of development in the financial sector, South Africa's financial sector does not meet the funding demand of many enterprises. The study employed various quantitative indicators to determine financial sector and trade credit use. To determine the role that trade credit can play to ensure access to the most efficient bank financing, trade credit was compared to bank credit.

The second objective of the study was to identify whether there was a relationship between selected measures of bank credit and trade credit in South Africa. Chapter 4 describes the methodology used. Trade credit was measured by accounts payable and lagged accounts payable. Many studies focusing on whether trade credit facilitates access to bank credit use accounts payable. Bank credit was considered a dependent variable and trade credit an independent variable of interest because the model

intended to identify whether trade credit can facilitate access to bank credit. In Chapter 5, the study observed that the variable trade credit was significantly related to bank credit for South African firms using both fixed effect and GMM model. This indicated a substitute relationship between bank credit and trade credit consistent with Molina and Preve (2012), and Atanasova (2007) studies. Tobit model provided different results, where trade credit had a positive sign and significant at 1% level. This indicated a complementary relationship, which is consistent with Psillaki and Eleftheriou (2014) that provided empirical support for the redistribution and signalling role or motive of trade credit. The model was however not robust to estimation technique used. The model was re-estimated using the lagged trade credit using fixed effect, GMM and Tobit methods. The lagged trade credit was positively related to Bkloan when using all methods. This indicates that, when using lagged trade credit as a variable of interest, the model became robust to estimation techniques used. This result supported the findings made by Teixeira (2008). Hence, the study argued that trade credit can be used as a way to signal the firm's quality, as suggested by Biais and Gollier (1997). This can help enterprises to build a good credit record and reputation and borrow at lower cost. Hence, trade credit can mitigate the information asymmetry by updating banks beliefs about the customer default risk (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). Based on the findings, the following section addresses the fourth objective of this study. Specifically proposes policy measures that can improve information sharing and access to credit by enterprises.

6.1. Policy Recommendations

In the light of the above, the following recommendations are drawn from this study:

As the relationship between the lagged trade credit and bank credit is positive, South Africa should gear its policies toward creating and strengthening information sharing between trade credit providers and banks. Trade credit reporting is still underdeveloped and not common practice in the South African market. The following regulatory steps should be considered:

- Some measures such as creating credit bureaus that focus on reporting trade credit information could contribute towards lessening the information asymmetry hence, the NCR should initiate the establishment of credit bureaus focusing on reporting trade credit information.
- Suppliers, especially small players, should be incentivised to report trade credit data to already existing credit bureaus. In addition, the credit bureaus should be incentivised to make an effort to obtain trade credit information. Trade credit data comes from several sources, and often the sources are not equipped to report accurately on their customers. These could be combined and correlated through credit bureaus.
- Many countries collect trade credit data for commercial lending, South Africa can learn from these countries on procedures they followed to ensure that trade credit information is reported to the credit registry/bureaus.
- Policies that support the development of technologies for the evaluation and monitoring of firms that are negatively affected by information asymmetry by being bank credit rationed might also be more effective.

Since trade credit was also considered to be a substitute for bank credit, the trade credit market should be regulated as an alternative source of finance. Firms should also establish a long-term relationship with their suppliers since trade credit is an important source of funding.

6.2. Areas for further research

Research on trade credit has been lacking in South Africa and African countries as a whole. Therefore, there is a need to conduct more studies focusing on trade credit. However, lack of data in this area is a limitation that should be addressed, especially as far as small businesses are concerned. According to Kwenda and Holden (2014), financial statements is open to manipulation by managers. Any overestimation or underestimation could compromise the results of this study. Hence, the use of annual financial statements data as the main source of data is the main limitation of this study. Managers cannot manipulate the data from the statistics department of a country, and it

could be beneficial for Statistic South Africa to start collecting trade credit data. Since access to finance is an important element for firms' growth, further research should be devoted towards the exact mechanism to address the lack of access to finance.

There are also many important issues not directly addressed in this paper, such as dividing results between small and large firms and macroeconomic[11] considerations such as the monetary policy. This is partly owed to the focus on the immediate concern of this study, but also partly due to data limitations. Further research is needed to identify if the results would differ between small and large firms by looking at the sample of small and large firms separately. For instance, Nilsen (2002), and Alatalo (2010) looked at small and large firms separately and found different results between the two groups, and Agostino and Trivieri (2014) and Alphonse et al (2006) focused just on small firms.

Moreover, in support of Kim and Lee (2014), all studies in this area only consider two credit instruments, namely, trade credit and bank credit. These are the most important ones, but firms use a more diverse set of credit instruments and some of which have intermediate properties between bank credit and trade credit. Therefore, there is a need for a theoretical extension to include other credit and funding instruments such as bonds and equity finance.

[11] The main objective of the study was not to identify how this nexus changes during expansionary and contractionary macroeconomics.

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Appendix

a) Fixed effect and pooled data model

The standard *F* -test is used to check fixed effects against the Pooled data model. The null hypothesis is that all the constants are the same and that therefore the pooled data method is applicable:

$$H_0: \ a_1 = a_z = \cdots = a_N$$

The *F* statistic is:

$$F = \frac{(R_{FE}^2 - R_{CC}^2)/(N-1)}{(1 - R_{FE}^2)/(NT - N - k)} \sim F(N-1, NT-N-k)$$

R_{FE}^2 Is the coefficient to determine the fixed effects model, and R_{CC}^2 is the coefficient to determine the pooled data model. If F-statistical is bigger than the F-critical or statistically significant, then we reject the null hypothesis.

Traditionally, panel data estimation has been mostly applied to data sets where *N* is very large and in this case, a simplifying assumption may be made which gives rise to the random effects model, as explained below (Asteriou and Hall, 2007)

To recap, the pooled panel data model assumes that the intercept/constant values of all the firms are the same and that the slope coefficients are all identical for all the firms. These are restricted assumptions; therefore, despite its simplicity, the pooled regression may distort the true picture of the relationship between trade credit and bank credit across 41 South African firms. These assertions need to be supported by appropriate statistical test (F-test) which is discussed below.

b) F- Test

The standard *F* -test can be used to check fixed effects against the Pooled, data model. The null hypothesis is that all the constants are the same (homogeneity) and that therefore the pooled data method is applicable. The F-statistic is statistically significant, hence, the null hypotheses that all the constants are the same can be rejected, and conclude that the pooled data method is not applicable.

What is now needed is to determine some way to take into account the specific nature of the firms. One way to take into account the individuality of each cross-sectional unit is to let the constant vary for each firm but still assume that the slope coefficients are constant across firms.

c) Graphical analyses for stationarity

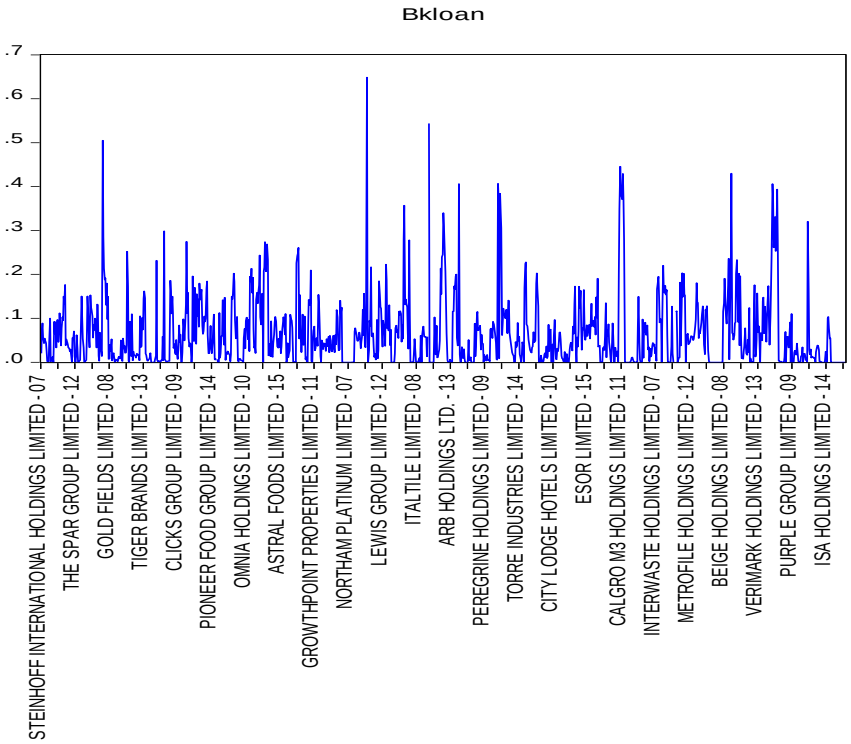

Figure 6: Bkloan graphical analyses

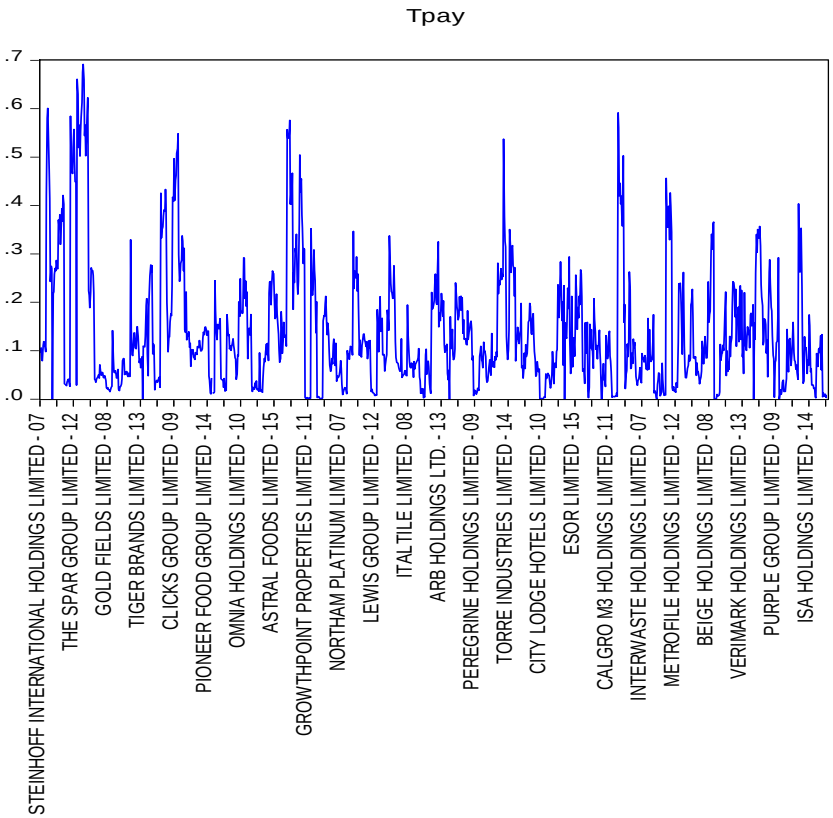

Figure 7: Tpay graphical analyses

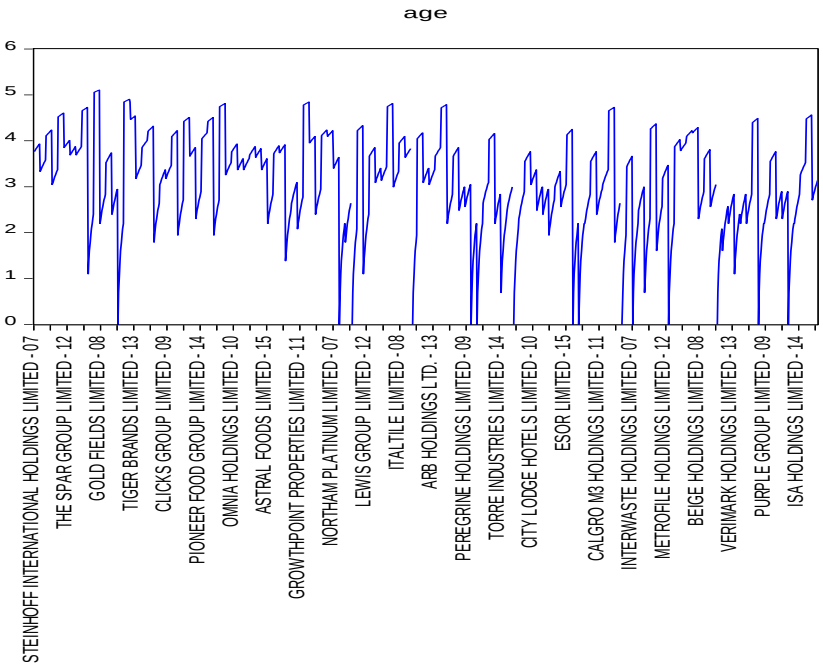

Figure 8: Age graphical analyses

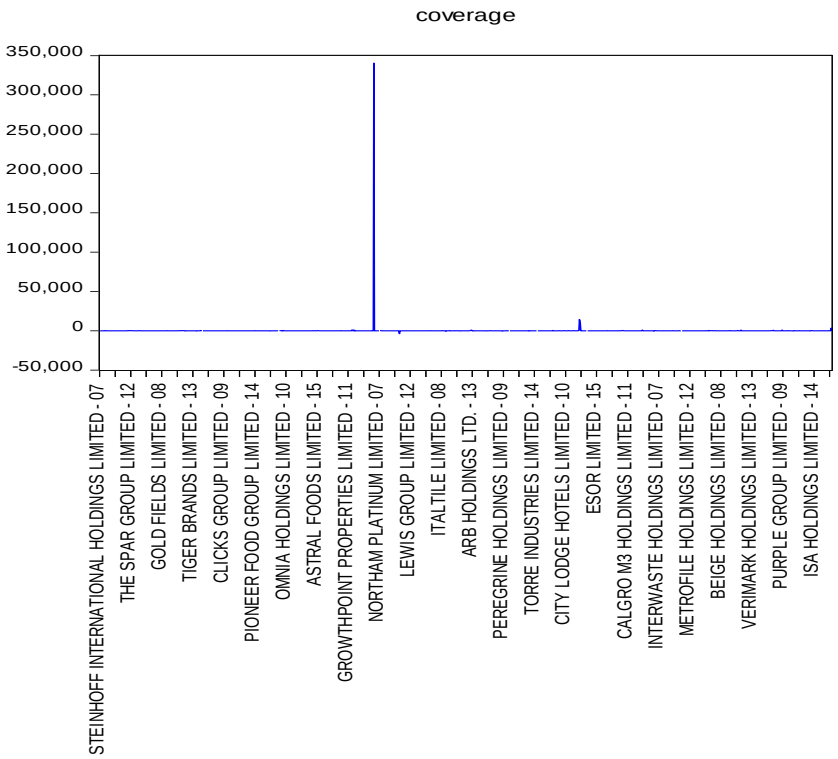

Figure 9: Coverage graphical analyses

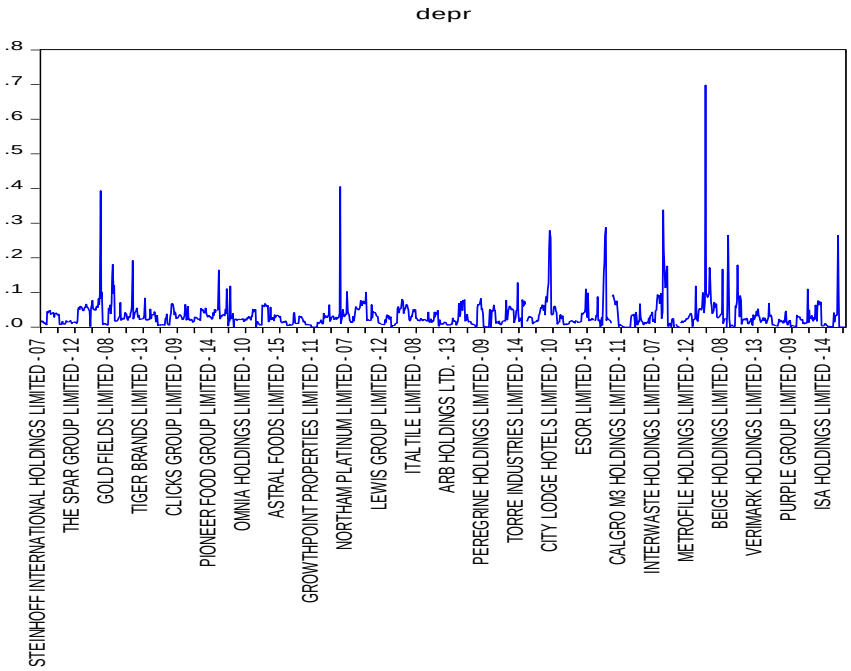

Figure 10: Depr graphical analyses

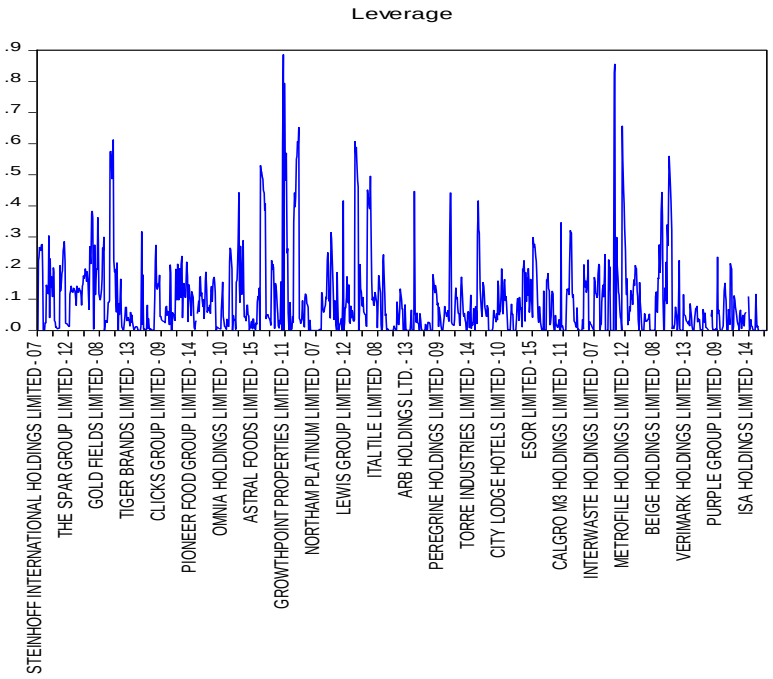

Figure 11: Leverage graphical analyses

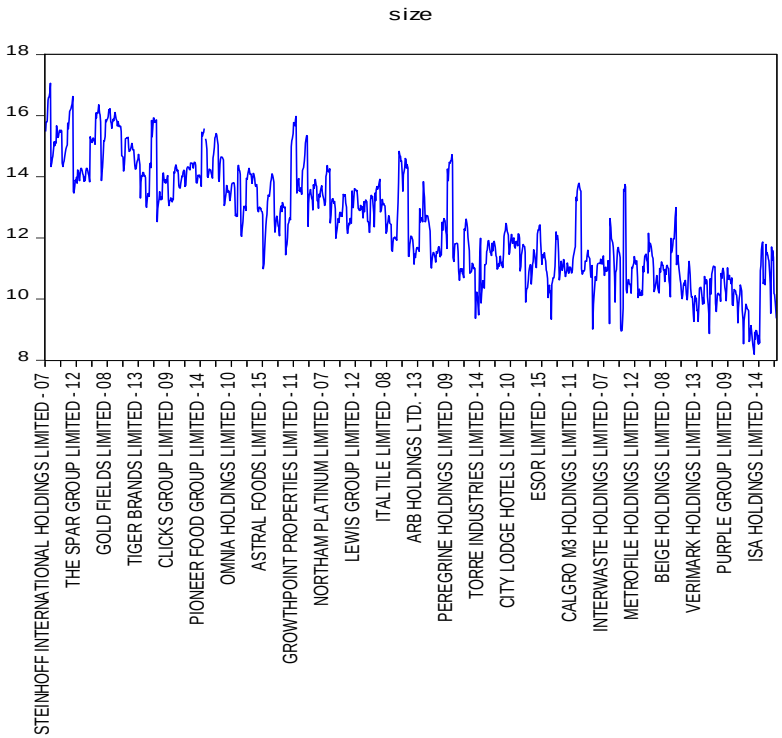

Figure 12: Size graphical analyses

Source: Author's computation using Eviews 7 Econometric Package

d) Robustness test

The study conducted estimations using alternative proxies to firm size (the natural logarithm of sales and the natural logarithm of total assets). The study also used another proxy to measure liquidity (Coverage ratio and Quick ratio). Using these proxies, Tpay remains negative and statistically significant at 1% level. The independent variable Age retains a positive sign, but become statistically insignificant. Size, when measured by the natural logarithm of sales, remains negative and statistically insignificant. Depr retains a positive sign and statistically significant at 1% level. Leverage retains a negative sign and statistically significant at 1% level. In addition, when liquidity is measured by a quick ratio; the sign remains positive, but becomes statistically significant at 1% level. Hence, the findings are similar to that of the main models and there were no significant changes to the signs of the independent variables as a result of changing the way to measure some variables.