

**FINANCIAL SECTOR DEVELOPMENT AND SECTORAL OUTPUT
GROWTH: EVIDENCE FROM SOUTH AFRICA**

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ABSTRACT

The goal of the study is to examine the relationship between financial sector development and output growth in the agricultural, mining and manufacturing sectors in South Africa. The analysis is based on the hypothesis that financial development is essential for promoting production growth in an economy. To test the hypothesis, in the South African context, the vector autoregressive model (VAR) framework and Granger causality test are applied to a quarterly data set starting from 1970 quarter one to 2009 quarter four. The results suggest that financial intermediary development (bank based measure) and stock market development (market based measure) have a positive impact on output growth in the agriculture, mining and manufacturing sectors in South Africa. There is evidence of a one way causal relationship between financial sector development and sectoral output growth. Particularly, there is evidence that financial intermediary development and stock market development causes output growth in the agriculture, mining and manufacturing sectors in South Africa. However, there is no evidence showing causality running from sectoral output growth to financial sector development. The results provide evidence supporting the theory which states that financial development is essential to promote output growth in a country i.e. in our case South Africa. Thus an efficient financial system which promotes efficient channeling of resources towards the agricultural, mining and manufacturing sectors should be built.

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DECLARATION

I certify that this thesis has not been submitted for a degree at any other university and that it is my original work except for where referenced within the document.

Signed.....

Date: 28 November 2011

FINANCIAL SECTOR DEVELOPMENT AND SECTORAL OUTPUT

GROWTH: EVIDENCE FROM SOUTH AFRICA

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CHAPTER ONE

INTRODUCTION

1.1. CONTEXT OF THE STUDY

In the history of financial economics literature, the link between financial sector development and production growth has been under extensive scrutiny. The debate over the years has been based on answering whether it is financial sector development that causes economic growth or it is economic growth that causes financial sector development in a country. A general implication is that financial sector development is an important determinant of economic growth in a country (Ang and McKibbin, 2007:216). Thus, theoretically financial sector development is likely to have a positive effect on output growth in an economy. In the nineteen-thirties Schumpeter (1934:24) highlighted that the banking industry plays an essential role of providing funds to entrepreneurial projects. As a result economists have regarded the development of financial sector as vital for economic growth in a country. This consideration is mainly stimulated by theoretical growth models that supply analytical frameworks incorporating Schumpeter's view (Neusser and Kugler, 1998:638). According to Greenwood and Jovanovich (1990:1085) financial intermediaries have the resources to undertake the process of acquiring and processing information about possible technological investments on behalf of investors. As a result more funds and resources are allocated to potential technological projects that later lead to stimulated growth and development in a country (Greenwood and Jovanovich, 1990:1085). In addition, Bencivenga and Smith (1991:197) suggest that banks and insurance companies provide investors with sufficient level of financial security. This allows companies to invest in large projects that add value to their production capacities rather than holding investments in unproductive projects (Bencivenga and Smith, 1991:198).

Financial intermediaries are also able to diversify risks across numerous investment projects and with the risks reduced (diversified), specialization is encouraged in industries, hence increasing productivity growth (Saint-Paul, 1992:771). In addition

Galetovic (1996:550) stated that, through their ability to access and process information about inventive activities of entrepreneurs, financial intermediaries increase effective allocation of investment in an economy. Overall the theoretical frameworks suggested by Greenwood and Jovanovich (1990), Bencivenga and Smith (1991), Saint-Paul (1992) and Galetovic (1996) imply that financial intermediation has a stable positive impact on production growth levels in an economy. Their observations are equally highlighted in recent studies by Liang and Teng (2006), Ncube (2007), Abu-Bader and Abu-Qarn (2008), Enisan and Olufisayo (2009) and Federici and Caprioli (2009). It is these frameworks that stimulated numerous empirical investigations on the causal relationship between financial sector development and economic growth.

There are three distinct observations in financial literature concerning the connection between financial development and economic growth. Firstly it is observed that financial development plays a significant role in boosting economic growth and this observation is supported by authors such as King and Levine (1993), Ahmed and Ansari (1998), McKinnon (1973), Ncube (2007) and Shaw (1973). Secondly it is observed that economic growth leads financial sector development and researchers such as Odhiambo (2008), Waqabaca (2004) and Enisan and Olufisayo (2009) support this observation. The last distinct observation supported by Luintel and Khan (1999), Al-Yousif (2002) and Calderona and Liu (2003) is that there is a two way (bi-directional) causal relationship between financial development and economic growth. There are numerous studies (for example Xu (2000), Deb and Mukherjee (2008) and Vazakidis and Adamopoulos (2009) amongst others) that have been conducted on the relationship between financial development and economic growth. However, these studies focus on the effect of financial development on overall economic growth i.e. Gross Domestic Product (GDP). In this case the effect of financial development on production growth of individual economic sectors is disregarded. Theoretically, productivity enhancing investment projects that economic sectors engage in depend extensively on external financial services, instruments and products offered by financial intermediaries and financial markets (Pavarish and Tarkamani, 2008:166). The financial system accumulates capital and allocates resources to innovative projects (e.g. technological projects) that later increase

output growth in sectors (Liu and Shu, 2002:80). This implies that the financial sector grants a real service in an economy thus when it comes to analysing growth and development in a country, the financial sector matters (Ncube, 2007:35). Consequently, developments or changes in the financial sector might have plausible implications for sectoral production growth in an economy.

1.2. GOAL OF THE STUDY

The objective of the study is to analyse the relationship between financial sector development and output growth of the agriculture, manufacturing and mining sectors in South Africa .Originally the growth of the South African economy depended on production contributions made by primary sectors towards national GDP (South African Reserve Bank Annual Economic Report, 2010). However, this is no longer the case as the growth of national GDP now relies heavily on production by tertiary sectors. Some of the well established sectors that are now vital contributors towards GDP are the agriculture; manufacturing; mining and metal; telecommunications and media; power and infrastructure; oil and gas sectors (South African Reserve Bank Annual Economic Report, 2010). The question to be answered by this study is whether or not financial development enhanced production growth in some of these sectors to the point where they are now regarded as key contributors towards national GDP. Specifically, the study seeks to determine whether financial development significantly impacts on sectoral output growth and if so determine whether there is a causal relationship between financial development and sectoral output growth in South Africa. The study will use the vector autoregressive (VAR) model and the Granger causality test technique. Financial development will be represented by the financial intermediary development and stock market development measures. The data set is quarterly data for the period 1970 to 2009.

The remainder of the study is organized as follows: Chapter 2 discusses the theory highlighting the importance of financial development for economic growth and reviews some of the studies that have been conducted on the relationship between financial development and economic growth. Chapter 3 describes data and the empirical method used in the study. In Chapter 4 the results and analysis of results are presented. Lastly, Chapter 5 is the conclusion of the study; areas of further study are also discussed.

CHAPTER TWO

THEORETICAL BACKDROP AND LITERATURE REVIEW

2.1 INTRODUCTION

The financial sector provides financial instruments, markets, and institutions that reduce information, enforcement, and transactions costs in the financial system (Beck and Levine, 2004:430). The reduced costs later positively affect the savings rate, investment decisions, technological innovations and economic growth rates in a country (Greenwood and Jovanovich, 1990:1090). This implies that the financial sector provides a real service in an economy (Ncube, 2007:35). Any developments or changes in the financial sector have significant implications for economic growth in an economy. Thus in analysing economic growth and development in a country the financial sector is important. However some researchers like Chandavarkar (1992) and Lucas (1988), state their doubts about the generalisation that financial development matters when analyzing economic development/growth in an economy. They claim that financial development is overly emphasised as a mechanism for economic growth. Studies have been carried out in financial economics on the relationship between the financial sector development and economic growth. The issue has been based on determining whether it is financial development that drives economic growth in the process of development or vice versa.

In this chapter we discuss the theories supporting the underlying general implication that financial sector development is an important determinant of economic growth in a country. Furthermore, we review empirical findings on some of the existing studies which have investigated the relationship between financial sector development and economic growth. In particular, we discuss the relationship between financial development and economic growth focusing on studies carried out in African countries and international countries. The chapter also reviews studies conducted on the relationship between financial development and sectoral output growth.

2.2 THE ROLE OF THE FINANCIAL SYSTEM

2.2.1 Introduction

The financial system performs several roles in the economy. The roles involve the following:

- Savings mobilisation
- Resource allocation
- Risk reduction
- Liquidity generation and trade facilitation
- Monitoring entities and enforcing corporate governance.

Each role is discussed in sections 2.2.2 to 2.2.6 below.

2.2.2 Savings mobilisation

According to Shan *et al* (2001:449), in mobilising savings funds are pooled by financial institutions from savers for on-lending to borrowers. The process of mobilising savings requires the financial system to undertake the burden of transaction costs associated with collecting funds from individuals and institutions (Shan *et al*, 2001:450). The process also requires the financial institution to overcome information asymmetry problems so they (financial institutions) may be able to convince savers to entrust the control of their savings to the institution (Liang and Teng, 2006:398).

2.2.3 Resource allocation

The financial institutions have the expertise to identify investment opportunities, accurately assess risks and make decisions about potential borrowers such that funds are allocated to the best possible investment projects (Levine, 1997:700). In other words the most suitable borrowers are chosen to allocate funds to. By allocating financial resources to projects with the high rates of return (best possible investment projects) productivity of capital is improved in an economy (Ncule, 2007:19).

2.2.4 Risk reduction

St-Paul (1992:771) states that by distributing investments across various projects financial intermediaries and financial markets reduce risk challenges faced by individual investors, firms and industries. The three types of risks reduced by these financial institutions are known as cross-sectional risk, inter-temporal risk and liquidity risk (Allen and Gale, 1997:525). According to Acemoglu and Zilibotti (1997:710) to reduce cross sectional risk the financial system provides tools to pool, trade and diversify risk such that agents can engage in high return projects which are typically more risky compared to low return projects. This in turn promotes more savings and leads to better allocation of resources in an economy (Acemoglu and Zilibotti, 1997:711). On the other hand, inter-temporal risk is diversified across generations (Allen and Gale, 1997:527). Financial intermediaries present financial instruments that reduce intergenerational risk. The instruments offer varied profits depending on whether there is an economic boom or bust in an economy (Allen and Gale, 1997:529). Lastly, to reduce the liquidity risk, financial institutions provide liquidity for projects that investors normally would not invest in due to uncertainty (Ncube, 2007:20). This process favours economic development in a country as a result of high levels of investment.

2.2.5 Liquidity generation and trade facilitation

Through influencing the savings rate positively or by reallocating savings, financial institutions may enhance economic growth through capital formation (Levine, 1997:531). This process requires liquidity, and the role of the financial institutions is to improve the liquidity of long-term investments that are needed to form capital (Abu-Bader and Abu-Qarn, 2008:890). According to Levine (1997:533) savers are reluctant to hand over control of their savings for a long term because of difficulties that arise when they need to withdraw their funds. However financial institutions create liquidity by investing funds in long and short term instruments such that investors can access their money whenever it is needed (Deb and Mukherjee, 2008:145). The combination of long and short term investments by financial institutions attracts more long term investment by agents and ensures in the case of borrowers that valuable long term investments are funded (Levine, 1997:533). The financial institutions also facilitate trade by granting credit, assuring payments and by

providing different financial tools like credit cards or demand deposits that facilitate the buying and selling of goods between individuals, firms and industries (Abu-Bader and Abu-Qarn, 2008:890).

2.2.6 Monitoring entities and enforcing corporate governance

Shliefer and Vishny (1997:740) argue that any absence of corporate governance obstructs savings mobilization and prevents capital from flowing to productive investments. The equity market allows equity holders to directly enforce corporate governance by controlling managerial performances (Beck and Levine, 2004:432). In other words, the market allows equity holders vote out managers that are not performing their duties. On the other hand, financial intermediaries like banks monitor the use of funds offered by lenders to borrowers (Ncule, 2007:21). The equity market and banks thus ensure that malfunctions that may obstruct investment and savings are eliminated (Shliefer and Vishny, 1997:742). Financial institutions also provide agents with ex-ante information concerning promising investment opportunities and capital accumulation thus reducing information asymmetries that might prevent equity holders from enforcing corporate governance (Beck and Levine, 2004:435).

The roles discussed above point out that an efficient financial system lessens external finance restrictions that hinder firm and industrial development (Allen and Gale, 1997:529). An efficient financial system assures an increased level of investments and savings, accumulates capital and allocates resources to innovative technological projects thus leading to increased output thus economic growth in a country (Liu and Shu, 2002:78). This is one way through which financial sector development can influence economic growth. The following part of the chapter discusses the theoretical connection between financial sector development and economic growth and reviews some of the existing work on the relationship.

2.3 FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH

2.3.1 Theory

Endogenous growth theory models services like risk diversification, savings mobilisation and liquidity generation offered by financial intermediaries. The theory

proposes that through these services there is an implied positive relationship between financial intermediation and economic growth (Ghali 1999:978). However it is important to note that this relationship can be affected negatively by intense government intervention in financial institutions. According to (Ghali 1999:985) government intervention through direct interventions such as interest rate ceilings and direct credit programs on the banking system restricts financial sector development, thus reducing economic growth.

Schumpeter (1934) focused on the services provided by financial intermediaries and argued that these are essential for innovation and development in a country. According to Schumpeter (1934:26) financial intermediaries provide services like savings mobilization and risk diversification and it is through such services that technological and economic development is encouraged. The main argument is that the services that the financial sector provides are a crucial mechanism for economic growth (Schumpeter, 1934:28). Shliefer and Vishny (1997:743) on the other hand suggest that evidence of absence of corporate governance may be a result of the presents of information asymmetries. It is financial intermediaries that reduce the problem of information asymmetries, consequently promoting corporate governance. Financial intermediaries that improve corporate governance reduce credit rationing which leads to higher productivity, capital accumulation and economic growth Bencivenga and Smith (1993:100).

According to Holmstrom and Tirole (1993:680) investors have an incentive to conduct research and acquire information on activities of firms listed in large and liquid stock markets. They argue that it is easy to gain from the acquired information by buying and selling stocks in large and liquid stock markets (Holmstrom and Tirole 1993:683). Thus stock market liquidity plays the essential role of promoting information acquisition by investors. This process increases investment levels leading to economic growth. On the other hand financial intermediaries promote economic growth through their ability to monitor firms' activities. By monitoring firms' activities, credit is allocated to competent producers who later use the credit to increase their production levels thus adding value to the economy (Pavarish and Tarkamani, 2008:170). In addition, financial intermediaries and financial markets reduce risk challenges faced by individual investors, firms and industries by

providing tools to diversifying risk (Shliefer and Vishny, 1997:744). Risk diversification allows agents to engage in high return projects which are usually more risky compared to low return projects (Abu-Bader and Abu-Qarn 2008:891). With increased investment rates in high return projects higher economic growth prevails in an economy (Acemoglu and Zilibotti, 1997:721). The availability of credit in the financial markets provides households with a mechanism for insurance against consumption, while diversifying risk (Ncule, 2007:19).

Financial institutions also provide services that undertake the expensive process of identifying investment opportunities on behalf of investors (Acemoglu and Zilibotti, 1997:730). For any potential investor there are high costs associated with assessing companies, managerial behaviours and market conditions to obtain sufficient information to spot an investment opportunity (Enisan and Olufisayo, 2009:165). The investor may not have the time and funds to collect, process and to produce information to spot an investment opportunity. The high costs associated with obtaining information disturb the flow of capital to its highest value use and the allocation of resources (Allen and Gale, 1997:529). Financial institutions thus reduce the costs of searching for investment opportunities on behalf of investors, promoting efficient allocation of resources and efficient flow of capital (Enisan and Olufisayo, 2009:166). Lastly, financial institutions mobilise savings which allows firms to obtain high return investment prospects and lessen inadequate production (Liu and Shu, 2002:78). The process changes savings rates which increases accumulation of capital and leads to better allocation of resources (Ncule (2007:18). Better allocation of resources promotes additional efficient technological innovations and ultimately stimulates higher economic growth in an economy (Liu and Shu, 2002:80).

The financial services and products provided by financial intermediaries and financial markets affect savings rates, investment levels, the flow of capital, allocation of resources and productivity in the economy (Waheed and Younus, 2009:35). Therefore it is important that the financial sector performs its services sufficiently to promote production growth. It is also important that the financial sector develops its services and products for the benefit of production growth levels (Ahmad and Malik, 2009:23). A lot of empirical work has been conducted to investigate the relationship

between financial sector development and productivity growth. The following part of the chapter reviews some of the empirical work carried out on the relationship.

2.3.2. Existing work on financial development and economic growth in African countries.

Demetriades and Hussein (1996) conducted a study on the relationship between financial sector development and economic growth in 16 developing countries over the period 1960 to 1993. The paper analyses the direction of causality between financial development and economic growth (real Gross Domestic Product) using time series techniques. The authors found little evidence that the financial sector is the leading determinant of economic development in developing countries but found substantial evidence of reversed causation (Demetriades and Hussein, 1996:387). The authors agree with the general idea that economic growth led by financial sector growth is harmful for developing countries (Demetriades and Hussein, 1996:387). A study by Abu-Bader and Abu-Qarn (2008) scrutinized the relationship between financial development and economic growth in Egypt covering the period 1960 to 2001. The Granger causality test, co integration and vector correction techniques were applied in the study (Abu-Bader and Abu-Qarn, 2008:885). The results showed that there is a two way relationship between financial development and economic growth (Abu-Bader and Abu-Qarn, 2008:890). Particularly, the results showed that it is through improved resource allocation and improved efficiency that financial development causes economic growth in Egypt (Abu-Bader and Abu-Qarn, 2008:893). They concluded that in order to enhance economic growth in Egypt, the government has to undertake the necessary methods to intensify the relationship between financial and real sectors (Abu-Bader and Abu-Qarn, 2008:897).

Furthermore, Enisan and Olufisayo (2009) examined the long run causal relationship between stock market development and economic growth in seven countries, namely Egypt, South Africa, Cote D'Ivoire, Kenya, Morocco, Zimbabwe and Nigeria. The study covered the period 1980-2004. The autoregressive distributed lag (ARDL) bounds test and the Granger causality test in the vector error correction model (VECM) framework were used in the analyses (Enisan and Olufisayo, 2009:166). The results of the ARDL test showed that stock market development leads to economic growth in Egypt, South Africa and Nigeria (Enisan and Olufisayo,

2009:168). On the other hand, the results of the Granger causality test in the VECM showed that stock market development and economic growth cause each other (bi directional relationship) in Cote D'Ivoire, Kenya, Morocco and Zimbabwe (Enisan and Olufisayo, 2009:169). Overall the authors concluded that in the seven African countries, appropriate regulation in the financial sectors lead to the development of the sectors, which later lead to economic growth (Enisan and Olufisayo, 2009:170). Similarly, Nowbutsing and Odit's (2009) study investigated the impact of stock market development on economic growth in Mauritius the over the period 1989 to 2006. The authors analysed the short run and long run relationship via an Error Correction model technique (Nowbutsing and Odit, 2009:79). The results showed a positive relationship between stock market development and economic growth in Mauritius in the short and long run (Nowbutsing and Odit, 2009:85). The authors concluded that there is a positive connection between financial sector development and economic growth in Mauritius (Nowbutsing and Odit, 2009:87).

In line with these studies that have investigated the relationship using the case of African countries, there are some studies that are based in international countries. The following part of this chapter reviews some of these internationally based studies.

2.3.3. Existing work on financial development and economic growth in international countries.

Amongst the existing international studies our paper focuses on studies by King and Levine (1993), Neusser and Kugler (1998), Rajan and Zingales (1998), Beck *et al.* (2000), Xu (2000), Sinha and Macri (2001), Arestis *et al.* (2001), Shan *et al.* (2001), Calderona and Liu (2003), Kemal *et al* (2004), Azarmi *et al* (2005), Liang and Teng (2005), Nieuwerburgh *et al* (2005), Shahbaz *et al* (2008), Deb and Mukherjee (2008), and Vazakidis and Adamopoulos (2009).

For the period 1960-1989, King and Levine (1993) used numerous financial development indicators and data on 119 developed and developing countries to examine whether financial development indicators successfully predict the value of economic growth indicators. The authors found evidence that financial development is a successful predictor of economic growth (King and Levine, 1993:735). Contrary

to the study by King and Levine (1993), Neusser and Kugler (1998:644) found a weak (insignificant) causal link between financial development and economic growth in 13 OECD countries during the period 1960-1994. The authors argue that financial development does not cause economic growth (Neusser and Kugler, 1998:645). The study was based on the theoretical models that speculate that financial sector development is crucial for economic growth Neusser and Kugler (1998:640). To investigate the causal link between the financial development economic growths the authors used the cointegration and causality test techniques (Neusser and Kugler, 1998: 642).

In another study Rajan and Zingales (1998) investigated whether financial development promotes economic growth. Particularly, the authors wanted to determine whether developed financial markets that generally fund industrial sectors cause growth in the sectors as a result of their services (Rajan and Zingales, 1998:559). They concluded that over the 1980s financial markets development promoted growth in industrial sectors in need of their finances (Rajan and Zingales, 1998:580). Another important study by Beck *et al.* (2000) examines the relation between financial intermediary development and economic growth using cross country and panel data techniques (Beck *et al.*, 2000:35). The results show a positive relation between financial intermediary development and economic growth thus concluding that financial intermediaries have a positive effect on the overall GDP growth (Beck *et al.*, 2000:40). The authors suggest that legal accounting procedures governing the financial sector boost financial sector development in the countries which later boosts economic growth (Beck *et al.*, 2000:45).

On the other hand, Xu (2000) examined the effects of financial development on investment and output growth. The author used the multivariate vector-autoregressive technique to conduct the study, using 41 countries over the period 1960- 1993 (Xu, 2000:332). The results showed strong evidence that financial development does not follow economic growth but it is growth that follows financial development in the process of economic development in these countries (Xu, 2000:334). Sinha and Macri (2001) used time series data for eight Asian countries to examine the relationship. The authors conducted multivariate causality tests between the two variables, that is, economic growth (income) and financial

development (Sinha and Macri, 2001:221). The results showed that for India, Malaysia, Pakistan and Sri Lanka there is a positive relationship between the income and financial development variables (Sinha and Macri, 2001:225). The results showed evidence of bi-directional causality between income and the financial development in India and Malaysia while in Japan and Thailand there was evidence that causality runs from financial development to economic growth (Sinha and Macri, 2001:226). For Korea, Pakistan and Philippines the authors found the case of economic growth promoting financial development (Sinha and Macri, 2001:227). Based on their findings, the authors argue that financial development is not essential for economic development (Sinha and Macri, 2001:230).

Utilising time series methods (vector autoregression (VAR) framework), Arestis *et al.* (2001:23) using data from five developed economies (Germany, United States, Japan, United Kingdom and France) examined the relationship between stock market development and economic growth for the period 1972-1998. Dissimilarly to other studies, this study controlled for the effects of the commercial banking sector and stock market volatility (Arestis *et al.*, 2001:24). The empirical findings showed that stock markets are able contribute to long-term output growth but this proves to be a small fraction when compared to the contribution made by the banking system to long term output growth (Arestis *et al.*, 2001:31). The results also showed that for the United Kingdom and the United States causality is statistically weak running from growth to financial development (Arestis *et al.*, 2001:32). Their findings were consistent with the view that bank-based financial systems may be more able to promote long-term growth than capital-market-based ones (Arestis *et al.*, 2001:38).

A paper by Shan *et al.* (2001) examined the relationship between financial development and economic growth for nine OECD countries and China. Using the VAR model and the Granger causality procedure to analyse this relationship the authors found a two way relationship between financial development and economic growth (Shan *et al.*, 2001:445). The results showed causality running from economic growth to financial development finding no evidence to support the assertion that financial development leads economic growth (Shan *et al.*, 2001:450). Calderona and Liu (2003:328) used the Granger causality test to examine the direction of causality between financial development and economic growth for the period 1960 to

1994. Dissimilar to the study by Shan *et al.* (2001), it was found that the causality between financial development and economic growth is bi-directional (Calderona and Liu (2003:329). The authors also find that financial development generally leads to economic growth, thus concluding that financial deepening drives economic growth (Calderona and Liu, 2003:330). Kemal *et al* (2004) focused on direct and indirect financing while investigating the causal relationship between financial development and economic growth. In the analyses the authors applied the methods of Nair-Reichert and Weinhold (2001) to evaluate the direction of causality (Kemal *et al*, 2004:13). The results showed that with rising inflation financial sector development might negatively impact on economic growth (Kemal *et al*, 2004:16). In line with the studies by Neusser and Kugler (1998), Sinha and Macri (2001) ,Shan *et al.* (2001) the authors argue that financial development is not necessarily essential for economic growth (Kemal *et al*, 2004:18).

In a study by Azarmi *et al* (2005), for the period 1981 to 2001, hypothesis testing was conducted to test whether stock market development was associated with economic growth in India. Similarly the authors found little evidence to endorse the hypothesis that stock market development is connected with economic growth in the Indian (Azarmi *et al*, 2005:63). It was also found that it is only in the pre liberalisation sub period that minor relevance of stock market development to economic growth is observed (Azarmi *et al*, 2005:65). During the post liberation period only negative correlation was found between stock market development and economic growth (Azarmi *et al*, 2005:70). Adding to the body of knowledge Nieuwerburgh *et al* (2005) examined the long-term relationship between financial market development and economic development in Belgium. The analyses used data on stock market development indicators to argue that financial market development significantly affected economic growth in the country during the period 1830 to 2000 (Nieuwerburgh *et al*, 2005:14). Utilizing Granger causality tests and cointegration analysis, their results showed strong evidence that stock market development caused economic growth in Belgium, particularly in the period between 1873 and 1935 (Nieuwerburgh *et al*, 2005:16). Liang and Teng (2005) in their paper examined the direction of causality between economic growth and financial development for the period 1952-2001 using a VAR framework. They found a two way causal

relationship between economic growth and financial development in China (Liang and Teng, 2005:406).

For the period 1971-2006, Shahbaz *et al* (2008) evaluated the causal linkages and dynamics between stock market development and economic growth in Pakistan using the Engle-Granger and ARDL tests (Shahbaz *et al*, 2008:185). The Engle-Granger causality test results showed that in the long-run, there is bi-directional causality between stock market development and economic growth (Shahbaz *et al*, 2008:189). However in the short-run the results show only one way causality from stock market development to economic growth (Shahbaz *et al*, 2008:190). Similarly Deb and Mukherjee (2008) test the causal relationships between the real GDP growth rate and three stock market development proxies in the Indian economy for the period 1996-2007. The unit-root tests and the long-run Granger non-causality test were used in the study (Deb and Mukherjee, 2008:143). The authors found causal flow from stock market development to economic growth (Deb and Mukherjee, 2008:145). Furthermore between real market capitalization ratio and economic growth, they observed a bi-directional causal relationship (Deb and Mukherjee, 2008:145). According to Vazakidis and Adamopoulos (2009:1936) in France it was economic growth that caused stock market development for the period 1965-2007. In order to find the direction of causality between stock market development and economic growth the Granger causality test was applied (Vazakidis and Adamopoulos, 2009:1935).

In spite of the number of the studies that have looked at the relationship between financial development and economic growth, there are few studies that have looked at the relationship between financial development and sectoral output growth. The following part of the study reviews some of the existing empirical findings on this particular relationship.

2.4. FINANCIAL DEVELOPMENT AND SECTORAL OUTPUT GROWTH

From a time-series view Neusser and Kugler (1998) explored the speculation that financial sector development is fundamental for sectoral output growth in the OECD countries. Specifically the authors examined the connection between financial sector

development and industrial advancement in the manufacturing sector (Neusser and Kugler, 1998:640). They find that for the period 1960-1994 the financial sector GDP is cointegrated with the manufacturing total factor productivity (Neusser and Kugler, 1998:643). This relationship is also confirmed by the Granger causality test which shows a causal relationship running from financial sector development to manufacturing sector development (Neusser and Kugler, 1998:644). The authors concluded that financial sector development is fundamental for sectoral output growth in the OECD countries (Neusser and Kugler, 1998:646). In the United States from 1900 to 1940, Dehejia and Lleras-Muney (2003) studied the impact of banking regulations on financial development and on sectoral output growth. The authors argued that instruments used by financial institutions determine whether financial development expands or contracts economic growth (Dehejia and Lleras-Muney, 2003:3). In the study it was found that for growth in the agriculture and manufacturing sectors, financial development resulting from expansion in banks plays a positive role (Dehejia and Lleras-Muney, 2003:13). On the other hand financial development resulting from expansions in insurance instruments plays a negative role on the growth of the manufacturing and agriculture sector (Dehejia and Lleras-Muney, 2003:15). Overall the results showed a positive and a negative impact of the financial sector development on output growth in the United States.

Using the VAR model and the Granger causality tests Parivash and Torkamani (2008:166) studied the effects of financial markets development on the growth of the agricultural sector in Iran for the period 1968 to 2005. According to Parivash and Torkamani (2008:167) there is a positive relationship between financial markets development and growth in the agricultural sector. Particularly, there was evidence that financial development enhances the growth of the value added by the agricultural sector to Iran's economic growth (Parivash and Torkamani, 2008:167). The results of the Granger causality tests showed that it is financial markets development that leads growth of the agriculture sector in Iran (Parivash and Torkamani, 2008:168). Diekmann and Westermann (2010) evaluated the theory that financial sector development promotes economic growth in Germany. For the analysis the authors used the VAR framework on yearly data for the period 1870 to 1912 (Diekmann and Westermann, 2010:5). The analysis focused on various

sectors in the economy, specifically agriculture, mining, trade and home services; and it was found that in all sectors the effect of development in the financial sector is positive (Diekmann and Westermann, 2010:14). The effect was extensively evident in sectors with firms producing non-tradable goods such as the agriculture (Diekmann and Westermann, 2010:17). Aka (2011) examined the link between the agricultural, industrial and utilities sectors' outputs for all countries of the West Africa Economic and Monetary Union (WAEMU). The author used the Johansen cointegration and Granger causality tests technique for the study in the period 1960 to 2005 (Aka, 2011:14). It was found that causality runs from financial development to sectoral growth except for the growth of the agricultural sector (Aka, 2011:20). The authors suggest that inadequate funds are being allocated to the development of the agricultural sector. Bakwena and Bodman (2011) evaluated the relationship between financial development and the mining sector over the period 1984-2003. The authors applied the Generalized Method of Moments (GMM) in a panel of 44 developing countries (Bakwena and Bodman, 2011:22). The results showed that financial development is vital for the efficiency of the mining sector in developing countries (Bakwena and Bodman, 2011:27).

Overall, it is clear that there are three distinct observations in financial literature concerning the causal relationship between financial development and economic growth. Some researchers find it is financial development that leads economic growth; others find it is economic growth that leads financial development while others find a two-way relationship between financial development and economic growth. The question at hand is what is the case in the South African context? Is there output growth in the agriculture, mining and manufacturing sectors in South Africa because of financial sector development? Or is there financial sector development because of output growth in the agriculture, mining and manufacturing sectors? Or is it a case where output growth in agriculture, mining and manufacturing sectors causes financial sector development as much as financial development caused output growth in these sectors. Economic literature provides several econometric techniques that can be used to empirically examine this relationship. The following chapter explains in detail the econometric techniques used in the study together with the data and the methods used while carrying out the estimations.

CHAPTER THREE

DATA AND EMPIRICAL METHOD

3.1 INTRODUCTION

In order to evaluate the relationship between financial sector development and output growth in the agriculture, mining and manufacturing sectors we use the VAR model and the Granger causality test. Through these techniques we will be able to determine the effects (positive or negative) of financial sector development on the growth of the three sectors. We will also be able to find the direction of causality between financial sector development and production growth of each of the sectors. In this chapter we explain the VAR model, estimation methods, variables and the data that will be used in the study.

3.2 MODEL AND ESTIMATION METHODS

3.2.1 Model

3.2.1.1 *Vector autoregressive model (VAR)*

The VAR model is generally utilised to predict a system of interrelated time series variables and to investigate the impact of unsystematic disturbances on a system of variables (Thangavelu *et al*, 2004:250). The model can be expressed in a matrix notation taking the form:

$$y_t = A_0 + A_1 y_{t-1} + \dots + A_p y_{t-p} + \varepsilon_t \quad (1)$$

where y_t is the n vector of endogenous variables,

A_1, \dots, A_p are the matrices of coefficients and

ε_t is a vector of changes/disturbances

In order to evaluate the link between financial sector development and sectoral output growth, we use a VAR model in the form:

$$X_t = \Pi_1 X_{t-1} + \dots + \Pi_k X_{t-k} + \mu + \varepsilon_t \quad (2)$$

where X_t is the vector that includes stationary variables in the system,

μ is the vector of the intercept and

ε_t denotes the stochastic error term

For the purposes of this paper, X_t in equation (2) represents a vector that includes the variables financial intermediary development (FID), stock market development (SMD), value added of agricultural sector (VAA), value added of mining sector (VAMI) and value added of manufacturing sector (VAMA). Thus for the investigation we used a model taking the following form:

$$w_t = \alpha_0 + \sum_{i=1}^k \alpha_1 w_{t-i} + \sum_{i=1}^k \alpha_2 x_{t-i} + \sum_{i=1}^k \alpha_3 y_{t-i} + \sum_{i=1}^k \alpha_4 z_{t-i} + \mu_{1t} \quad (3)$$

$$x_t = \beta_0 + \sum_{i=1}^k \beta_1 x_{t-i} + \sum_{i=1}^k \beta_2 w_{t-i} + \sum_{i=1}^k \beta_3 y_{t-i} + \sum_{i=1}^k \beta_4 z_{t-i} + \mu_{1t} \quad (4)$$

$$y_t = \gamma_0 + \sum_{i=1}^k \gamma_1 y_{t-i} + \sum_{i=1}^k \gamma_2 w_{t-i} + \sum_{i=1}^k \gamma_3 x_{t-i} + \sum_{i=1}^k \gamma_4 z_{t-i} + \mu_{1t} \quad (5)$$

$$z_t = \delta_0 + \sum_{i=1}^k \delta_1 z_{t-i} + \sum_{i=1}^k \delta_2 w_{t-i} + \sum_{i=1}^k \delta_3 x_{t-i} + \sum_{i=1}^k \delta_4 y_{t-i} + \mu_{1t} \quad (6)$$

where w_t is an indicator of VAA,

x_t is an indicator of VAMI,

y_t is an indicator of VAMA and

z_t is a measure for financial sector development (FID or SMD).

In a nutshell five variables are used to estimate the VAR model namely FID, SMD, VAA, VAMI and VAMA. In total six VAR models will be constructed each containing two variables (see table 3.1 below).

Table 3.1 The six models

Model	Variable
1	VAA,FID
2	VAA,SMD
3	VAMI,FID
4	VAMI,SMD
5	VAMA,FID
6	VAMA,SMD

In order to find an appropriate VAR model, it is essential to investigate whether the data series is stationary or not. For an appropriate VAR model, all the variables must be stationary (Burger, 2008:10). Additionally, to estimate an appropriate VAR model optimum lag length for the model must be selected where the information criteria can be used for this process (Parivash and Tarkamani, 2008:167). Thus to estimate an appropriate VAR model the stationarity of the different variables and the optimum lag length were considered.

3.2.1.2 Vector error-correction model

According to Shan and Morris (2002:160) a problem can occur where a causal relationship between two or more variables cannot be found. To solve this issue, it is suggested that an error correction term be included in estimating causality if the variables are cointegrated (Wong, 2004: 12). By including the error correction term, it is argued that any information lost due to the differencing process is reintroduced (Shan and Morris, 2002:161). The error correction model is generally presented in the following form:

$$\Delta B_t = \alpha_{10} + \sum_{i=1}^p \alpha_{1i} \Delta X_{t-i} + \sum_{i=1}^p \beta_{1i} \Delta Y_{t-i} + \gamma_1 ECT_{t-i} + \varepsilon_{1t} \quad (7)$$

$$\Delta C_t = \alpha_{20} + \sum_{i=1}^p \alpha_{2i} \Delta X_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta Y_{t-i} + \gamma_2 ECT_{t-i} + \varepsilon_{2t} \quad (8)$$

where Δ is the difference operator,

B and C are two endogenous variables,

ε_{1t} and ε_{2t} are the disturbance terms and

ECT_{t-i} is the error correction term

From equation (7), ΔC Granger causes ΔB if β_{1i} is not equal to zero and ΔB Granger causes ΔC if β_{2i} is not equal to zero. According to Shan and Morris (2002:162) there are two kinds of causations, one through the error correction term and one through the lagged difference terms.

3.2.2 Estimation methods

3.2.2.1 Unit root test

A unit root test is used to examine the stationarity of a series and it is important because it enhances the validity of results (Liu *et al*, 1997: 10). A series is considered stationary if it has a constant mean, constant covariance and constant autocovariances for each given lag (Brooks, 2002: 367). The unit root test can be conducted using the Augmented Dickey-Fuller (ADF) (1979) test and is represented by the following regression:

$$\Delta X_t = \delta_0 + \delta_1 t + \delta_2 X_{t-1} + \sum_{i=1}^k \alpha_i \Delta X_{t-i} + \mu_t \quad (9)$$

where ΔX_t - logarithm of all variables at time t,

ΔX_{t-i} - first differences with k lags,

U_t - variable adjusting the errors of autocorrelation and

$\delta_0, \delta_1, \delta_2,$ and α_i - coefficients estimated.

The null and the alternative hypothesis for the unit root in the variable X_t is:

$$H_0: \delta_2 = 0 \text{ and } H_1: \delta_2 < 0.$$

The null hypothesis in the test is that the time series has a unit root compared to the alternative null which states that the series does not have a unit root (Burger, 2008:113). Based on this hypothesis, if the calculated t-statistic is below the Dickey

and Fuller (1979) critical value, we reject the hypothesis that the time series has a unit root and conclude that the series is stationary. On the other hand, if the calculated t-statistic is above the Dickey and Fuller (1979) critical value, we fail to reject the hypothesis that the series has a unit root and conclude that the series is non stationary. The level of significance is tested at 5%.

3.2.2.2 Stationarity test

The stationarity test can be conducted using the Kwiatkowski *et al* (KPSS) (1992) test. To test how stationary the variables are, the paper uses this which does not suffer from small sample problems (Burger, 2008:11). The KPSS (1992) test is similar to ADF (1979) test but the KPSS test includes an automatic correction for auto correlated residual (Brooks, 2002: 381). A series that has a significant ADF statistic has an insignificant KPSS statistic. The KPSS test is conducted using the t-statistic following the same method as the ADF approach. The null hypothesis is that the series is stationary and is rejected when the calculated t-value is greater than the critical t value using the 5% level of significance.

3.2.2.3 Lag length selection

As mentioned earlier, it is essential to specify the appropriate lag length (k) of the VAR model. In principle only a minimum lag length sufficient to remove auto-correlation of the residuals should be selected (Wong, 2004: 11). For the purposes of this paper the number of lags to be included in the model was determined using the information criteria. Specifically, the methods used to find the appropriate lag length include the Sequential Modified Likelihood Ratio (LR), the Final Prediction Error (FPE), Akaike Information Criterion (AIC), the Schwarz Information Criterion (SC) and the Hannan-Quinn Information Criterion (HQ) (Luintel and Khan, 1999: 400).

3.2.2.4 Cointegration test

In order to examine the impact/effect of financial sector development on sectoral output growth cointegration analysis was carried out using the Johansen and Juselius (1990) maximum likelihood procedure. The procedure applies the maximum likelihood estimation to a VAR model to determine long and short run relations between the variables in the model (Ghirmay, 2004:250). The test estimates the long run relationship and provides error correction tool (vector error correction

model) for any dynamic adjustments needed in the model (Luintel and Khan, 1999: 401). Prior to conducting the formal cointegration test it is essential to specify the appropriate lag length (k) of the VAR system using the information criteria.

Considering a VAR model expressed in following equation as:

$$X_t = \Pi_1 X_{t-1} + \dots + \Pi_k X_{t-k} + \mu + \varepsilon_t \quad (10)$$

if the variables in the X_t vector are cointegrated, we estimate a first differenced p-dimensional (px1) vector error correction model presented as:

$$\Delta X_t = \varphi_1 \Delta X_{t-1} + \dots + \varphi_k \Delta X_{t-k} + \Pi X_{t-1} + \mu + \varepsilon_t \quad (11)$$

where X_t is the $k \times 1$ vector,

φ_k and Π are the $k \times k$ matrix of coefficients,

μ is the $k \times 1$ vector of constants and

ε_t is the vector of the disturbance term

The Π matrix suggests information about the long run relationship between the variables in the X_t vector (Chong and Caldero'n, 2000:80). The rank of the Π matrix depends on the number of linearly independent and stationary combinations of variables in the model (Hondroyannis *et al*, 2005:180). Consequently, cointegration testing includes determining (r) which represents the number of cointegrating relationships between the used variables in the model (Brooks, 2002:380). Literature provides the two likelihood ratio (LR) test statistics known as the Trace test statistic and the Maximum Eigen test statistic to determine the number of cointegrating relation(s) between variables. The trace test has a likelihood statistic ratio expressed as:

$$\lambda_{\text{trace}} = -T \sum_{i=r+1}^n \log (1 - \lambda_i) \quad (12)$$

where λ_i represents the i^{th} largest Eigenvalues of the matrix Π

T represents the number of used observations.

The null hypothesis tested is that the number of cointegrated vectors is less than or equal to r (Brooks, 2002: 382). In particular, the null and alternative null are in the form:

$$H_0: r=0 \text{ and } H_1: r \neq 0.$$

The Maximum Eigen statistic is:

$$\lambda_{\max} = -T \log(1 - \lambda_{r+1}) \quad (13)$$

where λ_{r+1} represents the $r+1^{\text{th}}$ largest Eigenvalues of the matrix Π

T represents the number of used observations.

The null hypothesis of the number of cointegrating vectors (r) is tested against the alternative hypothesis of that the number of cointegrating vectors equal to $r+1$ (Brooks, 2002: 381). The null and alternative null are:

$$H_0: r=0 \text{ and } H_1: r=1$$

or alternatively

$$H_0: r=1 \text{ and } H_1: r=2.$$

In the Trace and Maximum Eigen likelihood ratio tests the null hypotheses are rejected if the estimated value is greater than the critical values at the relevant level of significance and degrees of freedom (Tsheole, 2007:81).

Having discovered the cointegrating relationship between the variables in the vector X_t , a vector error correction model is then estimated in the form of equation (12) above. Evidence of error correction is found where the coefficient of a variable α is negative and significant (Brooks, 2002: 384). The negative shows the reversal of the errors and the significance reflects the importance of role played by the variable in the equation (Hafer and Jansen, 1991:150). After determining the order of cointegration and estimating the error correction model we then use to the error correction model (equation 12) to examine the causal relationships among the variables of the estimated model.

3.2.2.5 Granger causality test

To evaluate causality between the variables of the model we use the error correction model derived from the long-run cointegration relationship. The Granger causality test generally specifies a p th order VAR model as follows:

$$x_{1t} = \alpha_{10} + \Pi_{11}(N)X_{1t-1} + \Pi_{12}(N)X_{2t-1} + \varepsilon_{1t} \quad (14)$$

$$x_{2t} = \alpha_{20} + \Pi_{21}(N)X_{1t-1} + \Pi_{22}(N)X_{2t-1} + \varepsilon_{2t} \quad (15)$$

where α_{10} and α_{20} are constants and

$\Pi_{ij}(N)$ are polynomials of order $k - 1$ in the lag operator N

The VAR model is utilised to test the hypothesis that one variable does not Granger cause the other variable. The null hypothesis is that x_{1t} does not Granger cause x_{2t} (Burhop, 2006:50). For the purposes of this paper, the estimated error correction model is in the following form:

$$\Delta LFD_t = \text{lagged}(\Delta LFD_t, \Delta LVAA_t, \Delta LVAMI_t, \Delta LVAMA_t) + \lambda u_{t-1} + V_t \quad (16)$$

where Δ reports first differences of all variances (FD, VAA, VAMI and VAMA),

u_{t-1} are the estimated residuals representing deviation from the equilibrium in period t ,

λ represents the response of dependent variable in each period from the equilibrium point and

V_t represents a 4X1 white noise error vector

Causality can be detected through the lagged variables ΔVAA_t , $\Delta LVAMI_t$ and $\Delta LVAMA_t$. There is a causal relationship if the coefficients of the lagged variables are all statistically significant using the *F-statistic* (Thangavelu *et al*, 2004:255). In addition causality can also be detected through the coefficient of u_{t-1} where a causal relationship exists if the coefficient of u_{t-1} is statistically significant using the *t-statistic* (Burger, 2008:13).

In other words a uni directional or bi directional causal relationship between financial development and sectoral output growth exists if the coefficients of the lagged variables ΔVAA_t , $\Delta LVAMI_t$ and $\Delta LVAMA_t$ are all statistically significant or if the coefficient of u_{t-1} is statistically significant.

3.3 DATA

The variables used in the study include financial intermediary development (FID), stock market development (SMD), value added of agricultural sector (VAA), value added of mining sector (VAMI) and value added of manufacturing sector (VAMA). There are two measures of financial sector development namely FID and SMD, where one measure represents a bank based measure while the other represents a market based measure of financial sector development. The main reason for this classification is that the link between financial sector development and production growth is different between the two measures. It is thus important to distinguish between the bank based and the market based effects on output growth in the sectors under study.

The study uses the ratio of liquid liabilities of the financial intermediaries to GDP which equals M3 (broad money supply) divided by GDP as a measure of financial intermediary development (Dermirguc-Kunt and Levine, 1996:309). As a proxy for stock market development the study uses the market capitalisation ratio measure which is the value of listed shares divided by GDP (Dermirguc-Kunt and Levine, 1996:294). The data used in the study include: M3, GDP, market capitalization and sectoral contributions of each of the selected sectors to national GDP. The data set is quarterly data for the period 1970 to 2009. The data is obtained from the Johannesburg Securities Exchange (JSE) website, Thompson Data Stream and the South African Reserve Bank data download facility. The following chapter presents and analyses the results obtained while estimating using the models and estimation techniques explained in this chapter.

CHAPTER FOUR

RESULTS AND ANALYSIS OF RESULTS

4.1 INTRODUCTION

This chapter presents and analyses the results obtained while estimating using the models (VAR, VEC) and estimation techniques (unit root, cointegration, and Granger causality test) explained in chapter 3. First the unit root and stationarity test results are presented and analysed. Following are the results for the appropriate lag length selection process for the estimation of a model (VAR) for each of the six models. Then the study proceeds to the results and interpretation of the results of the cointegration test. The results demonstrating the impact of financial sector development on output growth in the agriculture, mining and manufacturing sectors are then presented and discussed. The last part of the chapter provides results of the examined causal relationship between financial sector development and sectoral output growth in the agriculture, mining and manufacturing sectors.

4.2 UNIT ROOT AND STATIONARITY TEST RESULTS

4.2.1 Graphical analysis

Before conducting the unit root and stationarity test it is useful to do a graphical analysis of the data series which helps to determine trends and linearity of the series. The graphs help to determine whether to include an intercept and trend in the equation used to test the stationarity of the series. Figure 1- Figure 5 below presents the graphs for each of the variables used in the study (FID, SMD, VAA, VAMA and VAMI).

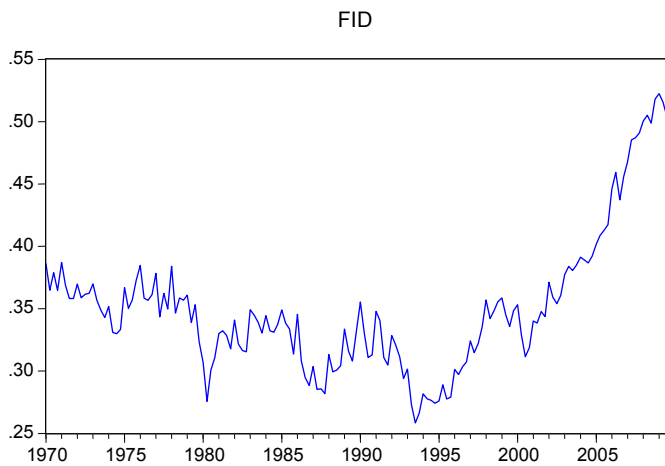


Figure 1 FID variable

Figure 1 shows that the series of the FID variable does not have a specific trend it follows i.e an upward or downward trend thus we do not need to add a trend factor when testing for the stationarity of this variable.

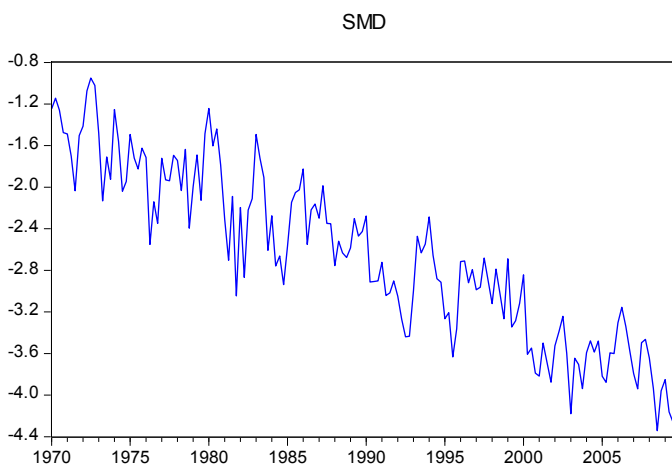


Figure 2 SMD variable

Similarly Figure 2 above shows that the series of the SMD variable does not have a distinct trend thus we do not need to add a trend when testing for the stationarity of this variable

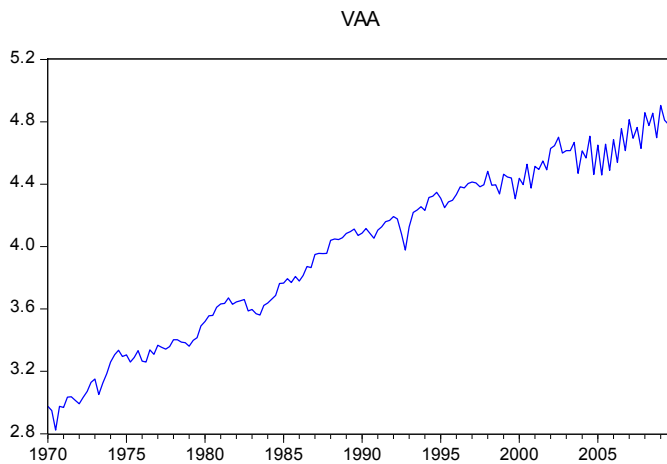


Figure 3 VAA variable

Figure 3 above showing the series of the VAA variable is somewhat different to the FID and SMD variables. There is little evidence of a trend as the series seems to be moving upward with limited upward and downward fluctuations that only prevail around 2004 onwards. Therefore we can add a trend feature when testing for the stationarity of this variable.

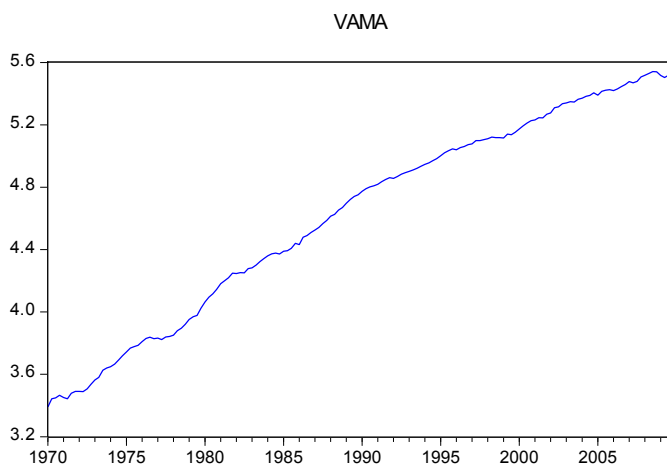


Figure 4 VAMA variable

Figure 4 above shows that the VAMA variable follows a distinct upward moving trend. It is thus necessary to include a trend feature when testing for the stationarity of this variable.

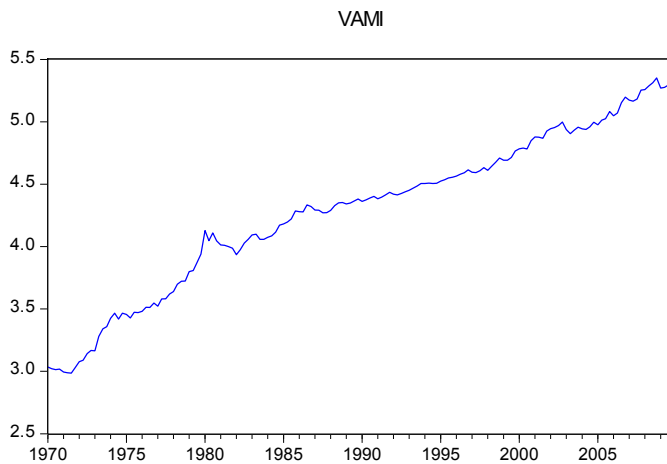


Figure 5 VAMI variable

Similarly, figure 5 above shows there is evidence of a trend as the series seems to be moving upward with no significant upward and downward fluctuations. Therefore we can indicate that the series has a trend in the testing for the stationarity of this variable.

According to the results of the graphs, for all variables except for FID and SMD a trend feature is included in testing the stationarity of the variables. Having conducted a graphical analysis of the data series of each of the variables we now conduct a unit root test and test the stationarity of the variables knowing the manner in which each variable needs to be tested i.e. we distinguish between adding a trend element in the test or not.

4.2.2 Unit root test

Table 4.2.2.1 Unit root test results

Variables	ADF test		5% Critical values
	I(0) Level	I(1) 1 st difference	
FID	0.722862	4.575906	2.880
SMD	1.997824	17.51467	2.879
VAA	2.690289	7.053469	2.880
VAMA	0.144447	7.055030	2.879
VAMI	2.104680	12.96910	2.879

The results in Table 4.2.2.1 above show that the null hypothesis that the time series has a unit root is rejected at level term for all the variables. Looking at the FID variable, for example, at the level term the calculated t statistic (**0.722862**) is less than the Dickey and Fuller (1979) critical t (**2.880**); thus we reject the null hypothesis that the series has a unit root and conclude that the series is non stationary at 5% level of significance. On the other hand, at first difference level the calculated t statistic (**4.575906**) is greater than the Dickey and Fuller (1979) critical t (**2.880**); thus we fail to reject the null hypothesis that the series has a unit root and conclude that at 5% level of significance (first difference) the series is stationary. The unit root test results show that all variables at first difference level have a unit root thus showing that the variables are stationary.

4.2.3 Stationarity test

Table 4.2.3.1 Stationarity test results

Variables	KPSS test		5% Critical values
	I(0) Level	I(1) 1 st difference	
FID	0.328807	0.049890	0.146
SMD	1.531074	0.081869	0.463
VAA	1.546863	0.159130	0.463
VAMA	0.375687	0.057540	0.146
VAMI	0.260400	0.072731	0.146

The results in Table 4.2.3.1 below show that the null hypothesis of stationarity is rejected when variables are at the level term. Looking at FID, for example, at the level term the calculated t (**0.328807**) is greater than the critical t (**0.146**); thus we reject the null hypothesis that the series is stationary and conclude that the series is non stationary. However at first difference the calculated t (**0.049890**) is less than the critical t (**0.146**); thus we fail to reject the null hypothesis that the series is stationary and conclude that the series is stationary at first difference. The stationarity test results reported suggest that all variables are I (1) which means the variables are integrated at order 1 and had to be differenced once to be stationary.

4.3 LAG LENGTH SELECTION

As mentioned in Chapter 3, it is essential to specify the appropriate lag length (k) of the VAR model. In principle only a minimum lag length sufficient to remove auto-correlation of the residuals should be selected (Wong, 2004: 11). Tables 4.3.1 to 4.3.6 below shows the information criteria report for each of the six VAR models used in the study. The star (*) indicates lag order selected by the criterion for that specific VAR model, LR is the sequential modified LR test statistic at 5% level, FPE is the final prediction error, AIC is the Akaike information criterion, SC is the Schwarz information criterion and HQ is the Hannan-Quinn information criterion.

Table 4.3.1 Model 1 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	115.5471	NA	0.0008	-1.4940	-1.4542	-1.4778
1	587.0689	924.4311	1.64e-06	-7.6456	-7.5262	-7.5971
2	637.3699	97.2926	8.91e-07	-8.2549	-8.0559	-8.1740
3	644.7754	14.1288	8.52e-07	-8.2997	-8.0211	-8.1865
4	679.8820	66.0559	5.66e-07	-8.7089	-8.3508	-8.5635
5	706.6053	49.5786*	4.20e-07*	-9.0079*	-8.5702*	-8.8301*
6	708.1665	2.8554	4.34e-07	-8.9758	-8.4586	-8.7657
7	710.4891	4.1869	4.44e-07	-8.9538	-8.3569	-8.7113
8	713.7997	5.8807	4.48e-07	-8.9447	-8.2683	-8.6699

The results in Table 4.3.1 of Model 1 which consists of the variables FID and VAA suggest that the optimal lag length for estimating the VAR model is lag **5**. In other words the appropriate lag length for model 1 is 5 lags.

Table 4.3.2 Model 2 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-176.6883	NA	0.0359	2.3511	2.3909	2.3673
1	138.1619	617.2719	0.0006	-1.7389	-1.6196	-1.6904
2	184.3844	89.4041	0.0003	-2.2945	-2.0955	-2.2137
3	189.4788	9.71954	0.0003	-2.3089	-2.0304	-2.1957
4	210.1770	38.9452*	0.0002	-2.5286	-2.1705*	-2.3831*
5	215.0415	9.0248	0.0002*	-2.5400*	-2.1023	-2.3622
6	217.1593	3.8734	0.0002	-2.5152	-1.9980	-2.3051
7	219.1989	3.6765	0.0002	-2.4894	-1.8926	-2.2470
8	222.9125	6.5966	0.0002	-2.4856	-1.8092	-2.2109

According to the results in Table 4.3.2 above, the appropriate lag length for Model 2 which consists of the variables SMD and VAA is 4 lags.

Table 4.3.3 Model 3 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	103.7263	NA	0.0008	-1.3385	-1.2987	-1.3223
1	724.2113	1216.4770	2.70e-07	-9.4501	-9.3307	-9.4016
2	733.7107	18.3738	2.51e-07	-9.5225	-9.3235	-9.4416
3	735.4158	3.2531	2.59e-07	-9.4923	-9.2137	-9.3791
4	746.4177	20.7010	2.36e-07	-9.5844	-9.2263	-9.4389
5	769.6407	43.0846*	1.83e-07*	-9.8373*	-9.3997*	-9.6595*
6	773.2621	6.6233	1.84e-07	-9.8323	-9.3151	-9.6222
7	774.5463	2.3151	1.91e-07	-9.7966	-9.1998	-9.5542
8	777.2683	4.8351	1.94e-07	-9.7798	-9.1034	-9.5050

As indicated in Table 4.3.3 above lag 5 is the appropriate lag length to estimate a VAR model for Model 3 which uses the variables FID and VAMI. The results in Table 4.3.4 below suggest that 2 lags are appropriate for estimating a VAR for model 4 (VAMI and SMD).

Table 4.3.4 Model 4 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-194.6721	NA	0.0455	2.5877	2.6275	2.6039
1	265.4572	902.0956	0.0001	-3.4139	-3.2945*	-3.3654
2	272.8049	14.2120	0.0001*	-3.4579*	-3.2590	-3.3771*
3	273.6720	1.6542	0.0001	-3.4167	-3.1382	-3.3035
4	277.4645	7.1359	0.0001	-3.4140	-3.0559	-3.2685
5	279.3436	3.4861	0.0002	-3.3861	-2.9484	-3.2083
6	283.3751	7.3733	0.0002	-3.3865	-2.8692	-3.1763
7	286.9311	6.4101	0.0001	-3.3806	-2.7838	-3.1382
8	292.4953	9.8838*	0.0001	-3.4012	-2.7248	-3.1264

On the other hand, Tables 4.3.5 and 4.3.6 below show that lag 5 and 1 were selected as optimal lag lengths for Model 5 (VAMA and FID) and Model 6 (VAMA and SMD) respectively.

Table 4.3.5 Model 5 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	88.8367	NA	0.0011	-1.1425	-1.1028	-1.1264
1	892.5608	1575.7220	2.94e-08	-11.6652	-11.5459	-11.6167
2	897.2076	8.9878	2.92e-08	-11.6737	-11.4748	-11.5929
3	902.1648	9.4578	2.88e-08	-11.6863	-11.4078	-11.5732
4	912.9489	20.2912	2.64e-08	-11.7756	-11.4175	-11.6301
5	938.0487	46.5666*	2.00e-08	-12.0532	-11.6156*	-11.8754*
6	942.1151	7.4373	2.00e-08*	-12.0541*	-11.5369	-11.8440
7	944.3347	4.0009	2.05e-08	-12.0307	-11.4339	-11.7882
8	947.9206	6.3698	2.06e-08	-12.0252	-11.3488	-11.7505

Table 4.3.6 Model 6 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-194.6042	NA	0.0455	2.5868	2.6266	2.6030
1	439.1112	1242.416*	1.15e-05	-5.6988	-5.5794*	-5.6503*
2	443.0829	7.682174	1.15e-05	-5.6984	-5.4995	-5.6176
3	447.2303	7.912747	1.15e-05*	-5.7003*	-5.4218	-5.5872
4	448.4084	2.2165	1.19e-05	-5.6632	-5.3051	-5.5177
5	451.0869	4.9693	1.21e-05	-5.6458	-5.2082	-5.4680
6	456.0743	9.1216	1.20e-05	-5.6588	-5.1416	-5.4487
7	457.6039	2.7573	1.24e-05	-5.6263	-5.0295	-5.3839
8	459.5315	3.4239	1.27e-05	-5.5990	-4.9227	-5.3243

4.4 COINTEGRATION TEST

With the optimal lag lengths determined in section 4.3 above, the study then proceeds into conducting the cointegration test. The results of the Trace and Maximum Eigen value tests are presented in Table 4.4.1 below.

Table 4.4.1 Johansen cointegration test

Model	Eigen value	Trace test				Maximum Eigenvalue test			
		H ₀	H ₁	Statistic	5%	H ₀	H ₁	Statistic	5%
1	0.2136	R=0	R=1	42.2567	25.8721	r=0	r≥1	37.7358	19.3870
	0.0283	R=1	R=2	4.5209	12.5179	r≤1	r≥2	4.5209	12.5179
2	0.2256	R=0	R=1	48.4488	25.8721	r=0	r≥1	39.6389	19.3870
	0.0552	R=1	R=2	8.8099	12.5179	r≤1	r≥2	8.8099	12.5179
3	0.1018	R=0	R=1	22.0782	25.8721	r=0	r≥1	16.4433	19.3870
	0.0361	R=1	R=2	5.6348	12.5179	r≤1	r≥2	5.6348	12.5179
4	0.2196	R=0	R=1	45.9382	25.8721	r=0	r≥1	38.9420	19.3870
	0.0435	R=1	R=2	6.9961	12.5179	r≤1	r≥2	6.9961	12.5179
5	0.0624	R=0	R=1	16.8789	25.8721	r=0	r≥1	9.8589	19.3870
	0.0448	R=1	R=2	7.0199	12.5179	r≤1	r≥2	7.0199	12.5179
6	0.2415	R=0	R=1	49.2825	25.8721	r=0	r≥1	43.4054	19.3870
	0.0367	R=1	R=2	5.8771	12.5179	r≤1	r≥2	5.8771	12.5179

The results for both tests show one cointegrating vector for models 1, 2, 4 and 6. The null hypothesis that there is no cointegration ($r=0$) is rejected if the calculated t statistic is greater than the 5% critical t statistic for both tests. For example in model 1, the calculated t statistic (**42.2567**) is greater than the 5% critical t statistic **25.8721** for the Trace test and the calculated t statistic (**37.7358**) is greater than the 5% critical t statistic (**19.3870**) for the Maximum Eigen test. Thus for both tests we reject

the null hypothesis that there is no cointegration and conclude that there is one cointegrated relationship between the variables in Model 1.

The results mean that between the variables used in Models 1, 2, 4 and 6 there is evidence of a long run equilibrium relationship. In Model 1 there is a long run relationship between financial intermediary development (FID) and output growth in the agricultural sector. The results also show that in Model 2 there is evidence of a long run relationship between stock market development (SMD) and output growth in the agriculture sector. On the other hand, tests on Model 3 show that there is no evidence of a long run relationship between financial intermediary development and output growth in the mining sector. As indicated by Model 4 there is evidence of an existing long run relationship between stock market development and output growth in the mining sector. According to Models 5 and 6 a long run relationship between financial intermediary development and output growth in the manufacturing sector does not exist while a relationship is found between stock market development and output growth in the manufacturing sector. The evidence of cointegration between the variables in Models 1, 2, 4 and 6 is in line with economic theory which implies that there is a relationship between financial development and output growth. It should be noted that the existence of the relationship itself implies a possible causal relationship between the variables.

4.5 THE IMPACT OF FID AND SMD ON VAA, VAMI AND VAMA

The results obtained while investigating the impact of financial sector development on output growth in the agriculture, mining and manufacturing sectors are presented in Tables 4.5.1 to 4.5.3 below. The variable has a positive impact if its coefficient has a positive sign. The significance of the variables was tested at 5% level and the absolute value of the t statistic has to be greater than 1.96 in order for that particular variable to have a significant impact.

Table 4.5.1 Impact of FID and SMD on VAA

Variable	Coefficient	Standard error	t-statistic
VAA	1.000000	-	-
FID	1.248874	0.24018	5.19980
SMD	0.078656	0.01291	6.09310

According to the results in table 4.5.1 above financial intermediary development has positive and significant impact on output growth in the agriculture sector. This is shown by the coefficient of the FID variable (**1.248874**) which has a positive sign and its significance is shown by the t statistic (**5.19980**) which is greater than 1.96. Similarly, stock market development has a positive and significant impact on output growth in the agriculture sector. The variable's coefficient is positive (**0.078656**) and significant as the value of the t statistic (**5.19980**) is greater than 1.96.

Table 4.5.2 Impact of FID and SMD on VAMI

Variable	Coefficient	Standard Error	t-statistic
VAMI	1.000000	-	-
FID	0.085564	0.03138	2.72670
SMD	0.109248	0.01679	6.50563

Table 4.5.2 above shows that FID and SMD have a positive and significant impact on VAMI. The coefficient of FID (**0.085564**) is positive and the value of the t-statistic (**2.72670**) is greater than 1.96 showing that the impact is significant. In the same way the coefficient of SMD (**0.109248**) is positive and the value of the t-statistic (**6.50563**) is greater than 1.96 showing that the impact is significant. In other words there is evidence that financial intermediary and stock market development play a positive and significant role in enhancing output growth in the mining sector.

Table 4.5.3 Impact of FID and SMD on VAMA

Variable	Coefficient	Standard Error	t-statistic
VAMA	1.000000	-	-
FID	0.340554	0.08821	3.86067
SMD	0.041550	0.00691	6.00821

According to the results in Table 4.5.3 above financial intermediary development has a positive and significant impact on output growth in the manufacturing sector. The positive impact is shown by the positive coefficients (**0.340554**) for FID and (**0.041550**) for SMD. On the other hand stock market development has a positive but and significant impact on output growth in this sector. The significance of the impact is made known by the t-statistic values (**3.86067**) and (**6.00821**) which are greater than 1.96 showing significance at 5%.

The two financial sector development measures FID and SMD separate the effects of financial intermediaries from those of financial markets on sectoral output growth. The results obtained suggest that financial intermediaries and financial markets have different impacts on output growth in these sectors. The case is true considering their diverse roles in the financial sector. Developments in the stock market development seem to play a more significant role than financial intermediary development in all sectors.

The results are in line with economic theory which indicates that there is a positive relationship between financial sector development and sectoral output growth. Overall they provide evidence that financial sector development does play a positive and significant role in enhancing production growth in the agriculture, mining and manufacturing sectors in South Africa. The significance of the impact implies that causality does exist in some direction between financial sector development and output growth in the sectors.

4.6 CAUSALITY TESTING

The study evaluates the causal relationship between financial sector development and sectoral output growth and the results are presented in Table 4.6.1 below.

Table 4.6.1 Granger causality test

Model	Lag	Null hypothesis (H_0)	Chi-square	P- value	Causal inference
1	5	FID does not granger cause VAA	12.0795	0.0602	Reject H_0
		VAA does not granger cause FID	9.4554	0.1495	Accept H_0
2	4	SMD does not granger cause VAA	35.2982	0.0000	Reject H_0
		VAA does not granger cause SMD	1.5259	0.8220	Accept H_0
3	5	FID does not granger cause VAMI	12.4548	0.0526	Reject H_0
		VAMI does not granger cause FID	6.5836	0.3611	Accept H_0
4	2	SMD does not granger cause VAMI	9.2641	0.0097	Accept H_0
		VAMI does not granger cause SMD	0.9473	0.6227	Reject H_0
5	5	FID does not granger cause VAMA	5.3697	0.4973	Accept H_0
		VAMA does not granger cause FID	10.5447	0.1035	Accept H_0
6	2	SMD does not granger cause VAMA	5.3141	0.0702	Reject H_0
		VAMA does not granger cause SMD	1.7194	0.4233	Accept H_0

The level of significance is tested at 10% (0.1), 5% (0.05) and 1% (0.01). The probability value has to be lower than 0.1, 0.05 or 0.01 for the null hypothesis to be rejected thus showing evidence of causality. The results for Model 1 show that FID Granger causes VAA at 10 % level of significance as the p value (**0.0602**) is lower than 0.1. This shows that financial intermediary development has had a positive significant effect on growth of the agriculture sector in South Africa. However there is no evidence showing the inverse, that the growth of the agriculture sector has had

an effect on the development of financial intermediaries. The results show that VAA does not Granger cause FID at any level of significance as the p value (**0.1495**) is higher than 0.1 (highest level of significance).

Similarly, the results for Model 2 show that stock market development Granger causes VAA at all levels of significance. Thus stock market development played a significant role in enhancing growth in the agriculture sector. For Model 3 we find a one way causal relationship between FSD and VAMI where FSD Granger causes VAMI at 10% level of significance. In Model 4 the study finds causality running from SMD to VAMI. These results show that financial sector development was an important determinant of growth in output in the mining sector. In Model 5 and 6 causality runs from FSD to VAMA and SMD to VAMA respectively but there is no evidence of an inverse relationship.

The evidence that FID and SMD Granger cause VAA, VAMI and VAMA as presented by the six models supports the general implication that financial sector development leads to growth in output levels. The results are not surprising as the South African financial system consists of well developed financial intermediaries and financial markets. They play a significant role in allocating resources and accumulating capital boosting the level of investment thus enhancing economic growth in a South Africa. According to the results stock market development appears to play a more positive and significant role in promoting output growth when compared to financial intermediary development. This implies that the stock market performs the role of allocating resources and accumulating capital better than financial intermediaries. Furthermore the stock market may be offering better financial instruments to invest in and its development may have lead to more mobilized capital, diversified risk and accessibility of information needed to make investments. The results show that financial sector development leads to growth in output levels in the agriculture, mining and manufacturing sectors in South Africa. This implies that financial sector development lead to national economic growth in the country for the period 1971 to 2009. The following part of the chapter thus views the contribution made by financial sector developments towards overall national GDP in the last decade. It also views contributions made by the agriculture, mining and manufacturing sectors over the last decade and discusses what supported the contributions. The aim is to connect

what the results show with what has been reported to have happened in the South African economy in the last decade with regards to these sectors and economic growth.

4.7 CONTRIBUTIONS MADE BY THE FINANCIAL, AGRICULTURE, MINING AND MANUFACTURING SECTORS TOWARDS ECONOMIC GROWTH IN SOUTH AFRICA

4.7.1. Contributions by financial sector developments in the last decade

According to South African Reserve Bank Annual Economic Report (2001:8) the real output in the financial sector grew at a rate of 5% in year 2000. The upward trend in the contribution by the financial services industry towards GDP was mainly motivated by high trading volumes in the equity market (South African Reserve Bank Annual Economic Report, 2001:10). However the industry did not keep its momentum through 2001 as the value added by the sector decreased dramatically because of lower growth levels in the equity market in this year. Trading volumes in the equity market (JSE Securities Exchange) lowered in 2001 and this had a negative effect on the performance of this sector thus the contribution it made towards economic growth (South African Reserve bank Annual Economic Report, 2001:10).

During a period of low interest rate in 2004, there was an increase in banking activity volumes in South Africa. This contributed positively to the economy as real output by banks improved significantly leading to real value by the financial sector increasing from 2% in the previous year to 5% in 2004(South African Reserve Bank Annual Economic Report, 2004:10). The increase could have been higher but the positives by the banks were counter acted by negatives from the equity market (South African Reserve Bank Annual Economic Report, 2005:9). Trading volumes in the JSE decreased in this period limiting the value added by the financial sector towards output growth (South African Reserve Bank Annual Economic Report, 2004:10).

Real value added by the financial sector accelerated to 5.5% in 2005, the strong growth was driven by better recorded trading volumes in the JSE (South African Reserve Bank Annual Economic Report, 2005:9). Additionally, banks still thrived in the low interest rate environment in 2004 but output growth was lower in 2005. In 2006 value added accelerated even higher to 8.75%. It was due to good financial and

business services provided by security dealers in the equity market and by banks (South African Reserve Bank Annual Economic Report, 2006:9). Unfortunately in 2007 activity in the financial sector slowed down with real value added declining to 6.5% due to poor performances in the banking services (South African Reserve Bank Annual Economic Report, 2007:10). The case was later reversed in the following year as output growth of the sector increased to 7.9% (South African Reserve Bank Annual Economic Report, 2008:9).

Due to the global financial crisis in 2009, output growth in the financial sector decreased to 1, 3 per cent (South African Reserve Bank Annual Economic Report, 2009:7). The recovery of the economy only saw growth levels increasing by 2.5 % in 2010 (South African Reserve Bank Annual Economic Report, 2010:7). It is stated in the South African Reserve Bank Annual Economic Report (2010, 6) that in 2010 better business conditions prevailed for banks, which were mainly promoted by growth in credit extension. Furthermore, according to the Annual Economic Report (2010:7), the securities market performed well as it also recorded high trading volumes during the period. However the speed of increase in value added by the equity market and banks decreased due to the financial crisis and restraint of credit extension (in the case of banks) in 2009 and 2010 (South African Reserve Bank Annual Economic Report, 2010:7).

The contributions made by financial sector developments towards GDP show that the financial sector plays a role in promoting economic growth. For example, in year 2001 and 2004, where the sector had little banking activities and trading activities in the equity market, real value added towards GDP declined thus lower economic growth was recorded. On the other hand, in year 2000 and 2005, where there were high trading volumes in the equity market real value added towards GDP by the sector grew significantly by 5% and 5.5% respectively. This shows that where there are developments in the sector such as increasing banking activity or increasing volumes of trading in the equity market, the sector promotes economic growth significantly and positively. This is in line with the findings of this study as the results showed that financial sector development has a positive impact on economic growth through its impact on output growth in the agriculture, mining and manufacturing sectors in South Africa.

It is also important to note that trading activities in the equity market play a more advanced role in adding value than banking activities. This is shown in year 2004 where value added by the sector towards output growth was at lower levels though the banking services had performed well. The lower levels were a result of low activities in the equity market. This is in line with the results of the study which showed that stock (equity) market development plays a more positive and significant role in promoting output growth than financial intermediary (banks) development. In the years (e.g. 2000, 2006 and 2010), where the sector recorded high growth rates in the value added it was mainly because of developments in the equity market.

4.7.2. Contributions by the agricultural sector in the last decade

Following unfavourable production levels in 1998, field crop production came to normal levels in 1999 leading to an increase in real value added by the agriculture sector from 3% in 1998 to 4.5% in 1999 (South African Reserve Bank Annual Economic Report, 2000:10). However the sector could not keep the momentum in 2000 and 2001 as output declined due to unfavourable weather conditions such as torrential rain, flooding, high temperatures and veld fires that negatively affected the eastern, northern, and south-western and fruit producing areas in the country (South African Reserve Bank Annual Economic Report, 2001:8). Furthermore delays in harvesting maize crop caused by wet soil conditions and limited diesel fuel reduced production by about 30% in 2001 compared to production levels in 2000 (South African Reserve Bank Annual Economic Report, 2001:9).

In 2002 production in the agricultural sector increased at a rate of 4.5% while in 2003 it decreased at a rate of 3.5% (South African Reserve Bank Annual Economic Report, 2003:8). The changes in production growth levels were caused by adjustments made in the maize and field crop production (Annual Economic Report, 2002:9). A decline of 18% in production was experienced because of poor field crop production (South African Reserve Bank Annual Economic Report, 2003:8). Dissimilarly, there was an increase in production levels in 2004 where an annual growth rate of 11% was recorded (South African Reserve Bank Annual Economic Report, 2004:6). This is believed to be caused by subdued non-maize field crop and horticultural production that improved fortunes in livestock farming (South African Reserve Bank Annual Economic Report, 2004:6)

Between 2005 and 2010 real value added by the agricultural sector towards gross domestic product somewhat fluctuated. The fluctuations were caused by changes in field crop production, favourable/unfavourable weather conditions, horticultural production and weakening of production prices compared to input prices (South African Reserve Bank Annual Economic Report, 2010:4). In the period 2005 to 2007 the sectors value added decreased from 4.5% to 2.75% partly because of weak trading terms (South African Reserve Bank Annual Economic Report, 2007:6).

Between 2008 and 2010 production levels moved from an annual increase of 16.1% in 2008 to an annual decline of 11.8 % in 2009 to an annualized increase of 2.3% in 2010 (South African Reserve Bank Annual Economic Report, 2010:4). Favourable weather conditions, increased field crop production and horticultural production over the period lead to the growth rates that were recorded in 2008 and 2010 (South African Reserve Bank Annual Economic Report, 2010:4). The decline in 2009 was a result of poor weather conditions and the effects of weak trading terms (South African Reserve Bank Annual Economic Report, 2009:6).

4.7.3. Contributions by the mining sector in the last decade

Between the period 2000 and 2010 real value added by the mining sector varied. For the first part of year 2000 output in the sector declined due to production cuts in the industry (South African Reserve Bank Annual Economic Report, 2000:8). However the industry gained momentum in the following year supported by favorable output volumes in platinum and diamond mining causing real value added by the sector to rise from 34% in 2000 to 34.5% t in 2001 (South African Reserve Bank Annual Economic Report, 2001:9).

In 2002 the industry did exceptionally well with increases in gold and diamond mining productions. The recovery in gold mining was a result of increases in production of ore deposits that have a high gold content (South African Reserve Bank Annual Economic Report, 2002:8). Diamond mining increased because of accelerated global demand for diamonds by jeweler manufacturers (South African Reserve Bank Annual Economic Report, 2002:8). Furthermore, the weakening of the rand played a positive role in boosting production in the industry (South African Reserve Bank

Annual Economic Report, 2002:8). It became cheaper to buy diamond and gold and the demand for the commodities increased.

Following the boom in 2002 the sector kept its momentum as the growth rate of real value added by the sector to GDP accelerated from 1.5% in 2002 to 2.5% in 2003 (South African Reserve Bank Annual Economic Report, 2003:8). The performance was lead by increased productions in platinum and diamond mining. Particularly, diamond mining was supported by global demand for rough diamonds that are used to refill stocks (South African Reserve Bank Annual Economic Report, 2003:8). In 2004 the growth rate somewhat remained the same at 2.5% but with support from platinum mining (South African Reserve Bank Annual Economic Report, 2004:8). Platinum mining was boosted by a strong demand for platinum by manufacturers for industrial use as metals made of platinum were components of new manufacturing processes (South African Reserve Bank Annual Economic Report, 2004:6). The growth rate of the sector remained at the same level of about 4% in 2005, which was heavily supported by platinum mining. Platinum mining continued to benefit from global demand for jewellery and industrial use i.e. automobile manufacturing (South African Reserve Bank Annual Economic Report, 2005:6). The international standards for clean emissions by cars supported the demand for platinum and increased domestic brick production (South African Reserve Bank Annual Economic Report, 2005:7). Real value added by mining decreased by about 0.75% in 2006 while production decreased even further in 2007 as the mining industry was slowed down by work general strike and shutting of a smelter (South African Reserve Bank Annual Economic Report, 2007:7). The real value added by the mining sector decreased by 5.4% in 2008 and 7.2% in 2009 (South African Reserve Bank Annual Economic Report, 2009:6). It was only in 2010 that the sector gained some momentum as the real value added by the sector increased at an annual rate of 2.6% (South African Reserve Bank Annual Economic Report, 2010:5). The better performance by the sector was supported by increased production levels in diamond, platinum group metals and other mining products such as iron ore, ferrochrome, nickel and copper (South African Reserve Bank Annual Economic Report, 2010:6). There was a significant global demand for platinum to be used in industrial production. Specifically, it was the demand from internal and external vehicle

manufacturers for catalytic converters that boosted platinum mining (South African Reserve Bank Annual Economic Report, 2010:6).

4.7.4. Contributions by the manufacturing sector in the last decade

The manufacturing sector saw an annual growth rate of 3% in the real value added by the sector in 2000 which was caused by the weaker rand exchanges when compared to foreign currency (South African Reserve Bank Annual Economic Report, 2000:8). Subsectors such as car manufacturers, metals industry, chemical products manufacturers and electrical equipment manufacturers mostly gained from the effects of the lower rand (South African Reserve Bank Annual Economic Report, 2000:8).

Growth in the real value added by the manufacturing sector was 3.5% in 2001 and 4% in 2002 (South African Reserve Bank Annual Economic Report, 2002:9). Production growth was mainly supported by the depreciation of the rand and increased domestic demand for internally manufactured products (South African Reserve Bank Annual Economic Report, 2002:9). The weakening of the rand made domestic products internationally competitive and benefited local exports. In contrast to growth of real value added recorded in 2001 and 2002, the annual growth rate declined to 2% in 2003 (South African Reserve Bank Annual Economic Report, 2003:8). The strengthening of the rand in 2003 supported the poor performance showed by the sector. However in 2004 the sector regained its momentum as real value added accelerated at a rate of 2.5% (South African Reserve Bank Annual Economic Report, 2004:7). Production of food, beverages, petroleum, chemical products, iron, steel, radio equipment and television equipment increased significantly in 2004 (South African Reserve Bank Annual Economic Report, 2004:8). The expansion of the China economy increased global demand for steel which in turn increased the contribution made by metal and steel manufacturers (South African Reserve Bank Annual Economic Report, 2004:8).

Growth slowed down at an annualized rate of 1.5% in 2005 as higher level of exchange rate made it difficult for manufactures to remain competitive in the international markets and domestic markets as domestic demand fell as cheaper substitute products were imported (South African Reserve Bank Annual Economic

Report, 2005:6). However in 2006, growth in real value added increased at an annual rate of 6% partly because of infrastructure development that expanded causing leading to an increased demand for intermediate and capital goods to be used for building and construction purposes (South African Reserve Bank Annual Economic Report, 2006:7). It was also because of lower rand exchanges that supported local exports and increased the demand for locally produced goods.

Growth momentum was lost by the sector in 2007 as the negative effects of high interest rates in the economy, strong rand and accelerating input costs slowed down the performance of the sector (South African Reserve Bank Annual Economic Report, 2007:8). Growth slowed from 6% in 2006 to 5, 2% in 2007 and to 2, 6% in 2008 (South African Reserve Bank Annual Economic Report, 2008:7). The real value added by the sector contracted in 2009 declining by 7.1% as a result of the effects of the global recession and reduction in domestic demand for locally produced goods (South African Reserve Bank Annual Economic Report, 2009:8). Due to recovery in global and domestic from the recession the sector recorded an annual growth rate of 5% in 2010 (South African Reserve Bank Annual Economic Report, 2010:6).

For the agriculture, mining and manufacturing sectors the results of the study show that besides the effects of weather conditions or currency fluctuations or global demands for products, there is also an effect of the development of the financial sector which supports production growth in these sectors. Financial institutions such as the Land Bank, Absa, First National Bank (FNB), Nedbank and Standard bank amongst others continuously design numerous financial products and services that best suit specific business needs of these sectors. The products include short/long term loans and projects loans which mainly suit the need to buy or improve capital equipment in the agricultural sector (Ahmad and Malik, 2009: 20). Rising input costs in the manufacturing sector are provided for as the financial institutions create financial products that assist businesses raise working capital (Khan et al, 2005:820). There are also hedging products that minimise production losses caused by fluctuating currency and insurance services designed to protect production against risk and unforeseen circumstances (Ahmad and Malik, 2009: 20). Absa bank helps (advises) businesses in the manufacturing industry on how to take full advantage of programmes such as Manufacturing Incentive programmes or the

Automotive Production Development programmes which are offered by the government. This shows that developments in financial products and services have a positive and significant impact on sectoral output growth. The following chapter concludes on all the findings of the study and recommends areas of further study.

CHAPTER FIVE

CONCLUSIONS

5.1 CONCLUDING REMARKS AND AREA OF FURTHER STUDY

In the study the relationship between financial sector development and sectoral output growth in the mining, manufacturing and agricultural sector is examined. The study is based on the economic theory that implies that financial sector development is essential in accelerating economic growth. Economic theory implies that there is a relationship between financial sector development and productivity growth where a positive or a negative relationship can be found. An efficient financial sector plays the role of mobilising savings, allocating resources, reducing risk, liquidity generation, and facilitating trade, monitoring entities and enforcing corporate governance such that higher economic growth is stimulated in an economy. This channel represents a positive relationship between financial sector and output growth rates. Thus any developments in an efficient financial sector should accordingly have a positive impact on production growth rates. An inefficient financial sector on the other hand does not function in a way that promotes productivity growth. This channel represents a negative relationship between financial sector and productivity growth rates. To test the theory in the South African context the VAR framework is used to examine the impact of financial development on output growth. The Granger causality test is used to determine the direction of causality between financial sector development and output growth.

The results showed evidence of a long run relationship between stock market development and output growth in the agriculture, mining and manufacturing sectors. On the other hand, the results showed no evidence of a long run relationship between financial intermediary development and output growth in the mining and manufacturing sectors. But a long run relationship was found between the financial intermediary development and the agricultural sector. According to the results financial intermediary and stock market development have a positive and significant impact on output growth in the agriculture and mining sectors. In the case of the

manufacturing sector, financial intermediary development has a positive and significant impact while stock market development also has a positive and significant impact on output growth. The study finds a one way causal relationship between financial sector development and production growth in the three sectors. There is evidence that financial intermediary and stock market development Granger cause output growth in the agriculture, mining and manufacturing sectors in South Africa. There is no evidence of an inverse relationship where production growth in the sectors leads growth in the financial sector.

While analysing the contributions made by financial sector developments towards GDP, it became evident that the financial sector plays a role in promoting economic growth in South Africa. The increases in banking activities and trading activities in the equity market have a positive and significant impact on output growth rates. Increases in banking activities are partly fueled by financial institutions like Standard Bank, FNB, Absa and Nedbank that are continuously developing financial products and services that are designed meet specific business needs in the agriculture; mining and manufacturing sectors. The products and services make it easy for businesses to acquire capital, to moderate risks and to lower operational cost pressures. This inturn contributes significantly and positively towards promoting production growth rates in these sectors thus leading to higher real value added by these sectors towards national economic growth. The study provides evidence that financial sector development was an important factor in promoting economic growth in the period examined. The study shows that by continuing to develop an efficient financial sector that provides financial services and products that meet specific production needs in the agriculture; mining and manufacturing sectors, economic development can be promoted further in South Africa.

The study is however limited as it shows the effects of banking and stock market developments on sectoral output growth. The scope of study could be broadened into examining developments in insurance companies or mutual funds or derivatives markets and their impact on sectoral output growth. Furthermore the relationship could be examined based other emerging sectors such as telecommunications or energy and power.

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