CREDIT EXTENSION IN SOUTH AFRICA: AN ANALYSIS OF THE IMPACT OF INTEREST RATES AND INCOME LEVELS ON THE LEVEL OF HOUSEHOLD DEBT

by

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DECLARATION

This page declares that the work produced is my own and was conducted whilst completing the degree of Masters of Commerce in Financial Markets whilst at Rhodes University. This thesis has not been submitted to other Universities, Technikons or Colleges for degree purposes.

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ABSTRACT

The recent growth in the unsecured lending market and the bankruptcy of African Bank Investments Limited have brought to light concerns regarding credit extension and the level of household indebtedness in South Africa. This study seeks to investigate the relevant aspects of credit extension in both the secured and unsecured lending markets by firstly analysing contemporary literature and then conducting a more formal empirical analysis. A VAR model is estimated to examine the effects household disposable income and interest rates have on the level of household debt in South Africa for the period 1995Q1-2015Q3. The empirical results indicate that there is no significant deterministic relationship between household disposable income and household debt. However, the results show that such a relationship does exist between interest rate and household debt. Finally, impulse response functions obtained from the VAR estimation are examined which indicate that both shocks too household disposable income and interest rates effect the level of household debt, but that this effect returns to equilibrium within six periods.

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ACRONYMS AND ABBREVIATIONS

Abil	African Bank Investments Limited
ADF	Augmented Dickey-Fuller
CDO	Collateralized Debt Obligation
DSR	Debt Service Ratio
DTI	Debt-to-disposable Income
FC	Financial Crisis
FDI	Foreign Direct Investment
GM	Great Moderation
GDP	Gross Domestic Product
HDI	Household Disposable Income
IMF	International Monetary Fund
KPSS	Kwiatowski-Phillips-Schmidt-Shin
NCA	National Credit Act
NCR	National Credit Regulator
SA	South Africa
SARB	South African Reserve Bank
SIV	Structured Investments Vehicles
U.S.	United States
VAR	Vector Autoregression

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CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter will provide an overall view of how the study is structured. Section 1.2 discusses the context/background of the study. Section 1.3 puts forward the main hypothesis and goals of this study. Section 1.4 reports the empirical methods, procedures and techniques that will be used in this study. Section 1.5 presents the organisation of the study.

1.2 Context of the Study

Over the last two decades there has been exponential growth in the lending market in South Africa. The secured lending market experienced rampant growth between the mid-90s and 2008, while the unsecured lending market experienced its growth spurt from 2009 until 2012. Concerns regarding this exponential growth in the unsecured lending market began to surface in 2012 when some theorists warned that if household indebtedness along with other macroeconomic problems in South Africa were not addressed then South Africa could be heading towards a debt crisis similar to the financial crisis (FC) of 2007/2008 (Colombo, 2014). This possible debt crisis, it is argued, is due to the exponential growth in the relatively unregulated unsecured lending market and with the recent bankruptcy of African Bank Investments Limited (ABIL) it seems that this argument has become more relevant. Research is needed to investigate this argument with regards to the growth in the lending market in the two periods and to examine the current circumstances to ascertain whether shocks to interest rates and/or household disposable income (HDI) affect the level of household indebtedness and, if they do, the persistence of these shocks.

For two decades, prior to the FC in 2007/2008, the United States (U.S.) experienced a sustained period of stable macroeconomic growth, which became known as the Great Moderation (GM) (Bernanke, 2012). This was due to the fact that there was a stable upward trend in Gross Domestic Product (GDP) that was not affected by inflationary pressures. This is ascribed to a number of factors, including improvements to inventory management and monetary policies, the effect of smaller shocks (i.e. good luck), as well as financial sector innovation (Cecchetti *et al.*, 2005). The theory is that better inventory management policies helped stabilise output by improving the processes used to handle and distribute stock. This was also assisted by the increase in knowledge regarding consumer demand. The premise

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behind better monetary policy playing a role was that during the mid-1980s the Federal Reserve Bank changed their monetary policy from an accommodative one to a proactive one of inflation targeting. This new monetary policy along with a low interest rate environment resulted in the housing market boom that was experienced in the U.S. during the early 2000s and it is argued that it was the collapse of this boom that contributed to the U.S. FC. The good luck theory is based on the idea that it was small exogenous shocks caused the GM not a big macroeconomic shock (e.g. a change in monetary policy). The argument behind financial innovation assisting in the GM is that with a change in monetary policy came a period of financial deregulation which, amongst other things, allowed consumers greater access to credit and alleviated a number of regulations that prohibited the amount of credit financial institutions could give out. In other words financial innovation resulted in an increase in the supply of and demand for credit. A negative effect of this was an increase in reckless lending as banks sought to increase profits and decrease risk through the process of securitization of loans and third party dealings.

In the mid-2000s White (2006) warned that if changes were not made to the current policy of financial innovation and deregulation then the current credit boom would bust. This was shown to be true when the housing market tanked due to the increasing number of defaulting sub-prime loans. This caused a collapse of the financial system in the U.S. as investors could not distinguish between the good and bad assets as they had been bundled together into collateral debt obligations (CDOs). The banking system was also affected as retail banks were, for the most part, the original lender of the loans. In other words it was their reckless lending and securitization of sub-prime loans that formed the foundation of the FC.

The effect of the GM was also felt in South Africa; however, this was at a much later date as the apartheid regime meant that significant trade and financial sanctions limited the interaction between South Africa and the global economy Burger (2008). Similar factors to the ones ascribed to the GM in the US, were investigated as to their effect in South Africa. It was found that better monetary policy and financial innovation played a crucial role in the period of low volatility in South Africa. What is evident is that the political situation in South Africa and its effect on foreign relations played a role in when and how the effects of the GM were felt in South Africa.

The South African financial sector was also affected by the FC as it experienced decreases in foreign direct investment (FDI) as well as decreases in the stock market. South African banks were also affected as they had to tighten lending standards. But, most financial effects were

diminished as South Africa maintained stringent monetary and fiscal policies. However, financial sector problems became real sector problems as a decrease in foreign demand, a subsequent decrease in income (mainly through a decrease in exports), increase in risk aversion and an outflow of capital as investors sought safer markets resulted in decreased industrial production and commodity prices, an increase in unemployment and a deterioration of the GDP growth rate.

Due to the FC there was a decrease in secured credit granted in South Africa, but total credited granted did not decrease by a similar amount. This was mainly due to consumers seeking other avenues of credit with which to finance their spending. One of these avenues in South Africa was unsecured credit and, post the FC, the unsecured credit market experienced a growth spurt as more consumer and credit providers moved into the market. The growth in the market was driven by a number of demand and supply side factors including increased access to and appetite for credit, debt consolidation, the implementation of the National Credit Act (NCA) and the increase in the wage rate of low and middle income workers. All these factors contributed to a 173.73% increase in the rand value of the unsecured credit market between 2010 and 2012. However, in 2012 concerns started to be raised regarding the stability of the market. These concerns covered the need for greater transparency of the NCA, the high interest rate that is charged, the financial education of the borrowers so that they could fully understand how the loan they take out works. These concerns became of a greater importance with the worsening of the South African economy in 2012, which had a direct effect on a consumer's ability to make the stipulated debt repayments. These factors led banks to decrease their risk and liability in the unsecured lending market, which decreased the growth of the market as the supply of credit decreased.

ABIL played an important role in the unsecured lending market as it had the largest portion of the market (Dlamini, 2013). An important note about ABIL is how its business model differentiated from other retail banks in that it did not hold a large percentage of deposits (roughly around 1% of revenue) rather than obtaining its capital through bonds and investments. This business model restricted the diversification of the bank making it vulnerable when the growth rate of the unsecured lending market slowed as it did not have any other avenues with which to obtain capital. With the economy worsening and unemployment increasing problems started to arise for ABIL as HDI dropped and defaults increased. In 2013/2014 ABIL started recording drops in earnings, one of more than 25%.

The final nail was when ABIL reported a financial year loss of over seven billion rand, which caused investors to move away from ABIL and saw ABIL's stock value drop by over 80%.

What is evident from the literature reviewed is the importance of household debt to economic growth and that it must be managed correctly or else a country could face a debt crisis.

1.3 Hypothesis and Goals of the Study

The hypothesis posited is that a change to either interest rates and/or disposable income has a significant impact on the level of household debt in South Africa. This is an important topic in a country which has a large domestic lending market indicated by a debt-to-disposable income (DTI) ratio of over 80% and where the majority of the low-middle income workers are in debt. This study seeks to extend the literature on credit extension in South Africa by focusing on the secured and unsecured markets.

The main goal of this research is to analyse relevant aspects of credit extension in South Africa. There are supplementary goals that will help to achieve the main goal, and these are to:

1. Analyse the proportionality of secured and unsecured credit extension to total credit in South Africa.
2. Establish the sensitivity of the level of household debt to interest rates and income levels.

1.4 Methods, Procedures and Techniques

A time series analysis will be employed to explore the relationship between household debt, interest rates and HDI. The debt service ratio (DSR) is used as a proxy for the level of household debt, while the prime lending rate is used to represent nominal interest rates and HDI is used to denote the income level of households. Quarterly data was obtained from the South African Reserve Bank (SARB) to investigate the period 1995Q1 to 2015Q3. This period was chosen as it covers the GM, the FC, the growth in unsecured lending and the bankruptcy of ABIL.

A log-log model is used to normalise the variables which simplifies interpretation by modifying the data to proportional/percentage changes. The Augmented Dickey-Fuller

(ADF) unit root test, the Phillips-Peron test (PP) and the Kwiatowski-Phillips-Schmidt-Shin (KPSS) test for stationarity are conducted to ensure that all the variables are stationary as it improves the estimated models accuracy. A Vector Autoregession (VAR) model is estimated to investigate the relationship between the variables and statistical significance thereof. Diagnostic tests are conducted to ensure the reliability and validity of the estimated model. Finally, to analyse how the effects of shock(s) on the exogenous variables are transmitted to current DSR the impulse response functions obtained from the estimated VAR model are considered. Graphical analysis of the Cholesky orthogonolisation technique is used in this study.

1.5 Organisation of Study

The study is divided into six chapters. Following this introductory chapter, Chapter 2 discusses the literature regarding the growth of credit extension in the U.S. during the GM and the cause and effect of the FC. Chapter 3 focuses the examination of the growth in credit extended and household debt on South Africa discussing the GM, FC and the growth in unsecured loans post the FC. Chapter 4 describes the empirical framework used to investigate the relationship between household debt and various macroeconomic variables. Chapter 5 presents the empirical findings that were obtained. Finally, Chapter 6 will conclude the study and highlight possible areas for future study.

CHAPTER 2: CREDIT EXTENSION IN THE U.S. AND THE SUBSEQUENT FINANCIAL CRISIS.

2.1 Introduction

This chapter discusses various arguments and theories that cover the GM and the 2007/2008 FC, as well as the effects of both on the U.S. The causes for the GM are discussed with regard to their effects on the U.S. economy and how each helped create and sustain an environment within which credit granted and household debt grew. Features of this period are (i) stable growth and inflation rates, (ii) increasing household income and (iii) the deregulation of financial markets; all of these factors contributed to an increase in the amount of credit extended to households with both the demand for and supply of credit increasing. The structure of the chapter is as follows: Section 2.2 discusses the GM in the U.S. and how it created an environment in which the amount of credit extended to households increased. Section 2.3 considers the effects of the increase in credit extension and how it led to a financial crisis. Section 2.4 concludes.

2.2 The Great Moderation in the U.S.

The literature regarding the period of stable macroeconomic indicators (growth and inflation) which began in the U.S. during the mid-80's and resulted in an unprecedented period of growth is considered here. Various theories on the causes / initiating factors of this period are considered, as well as how an environment was created that saw an increase in household debt in the US, specifically in the housing market which, as a result of defaults on sub-prime loans, led to the FC in the U.S in 2007/2008.

The GM was not confined to the US; most industrial countries experienced a period of stable economic growth characterised by a decline in the volatility of the rate at which output grew (Bezemer, 2009; Bernanke, 2012; Cecchetti *et al.*, 2005; Clark, 2013). The underlying cause(s) behind the GM have been widely discussed; the most frequently cited are improved inventory management policies, better monetary policy, good luck and financial innovation. These will be discussed to assess the role each played in creating a stable output environment in which banks and other financial institutions were able to increase the amount of credit extended to households and the resulting increase in household debt.

2.2.1 Improved inventory management policies

Cecchetti *et al.* (2005) argue that, while changes in inventory were a small percentage of the change in GDP, changes in private inventory amounted to almost 20 percent of the quarterly volatility in GDP growth. Because of the importance of private inventory to GDP growth, changes in inventory management policies could affect the volatility of the GDP growth rate. An example of such changes is an improvement to the technological processes used to handle and distribute goods and services; this is most evident in the way supermarkets handle their stock by keeping minimal levels of the stock required. This allows more flexibility in responding to changes in consumer demand. With demand and supply brought closer together, the inherent volatility in pricing and output is stabilised.

Kahn *et al.* (2002) extend this idea by arguing that improved information regarding consumer demand would assist in improving inventory management policies; suppliers who are better informed about consumer demand are better able to change supply to meet the consumer demand. This would lead to a further improvement in the volatility of prices and the GDP growth rate. Summers (2005) focused on cross-country evidence using the G-7 countries (Canada, France, Germany, Italy, Japan, U.K and U.S) and Australia to consider the importance of improvements in inventory management policies and found that improved information enabled essential modifications to the nature of the production and distribution process. This resulted in reduced volatility in the sales and production of durable goods; a strong positive correlation between inventory investment volatility and GDP volatility was found across the eight countries.

The literature on the topic is unanimous in the notion that improvements in inventory management did play a role in decreasing the volatility of GDP and inflation through product and price control. By reducing the level of uncertainty, GDP growth was stimulated. The resultant increase in household demand allowed them to increase the income allocated to both consumption and investment. This is illustrated in Figure 2.1 overleaf, which depicts annual U.S. GDP, HDI (in billions of dollars) and inflation rate in the U.S. from 1984 until 2007. What is evident from the graph is that the inflation rate (right axis) declines significantly for the period and that the deviations in the rate become less pronounced. What is also apparent is the steady growth of both GDP and HDI (left axis).

Figure 2.1: U.S. GDP, HDI and Inflation, Annual Data 1984 to 2007

Source: BEA (2016)
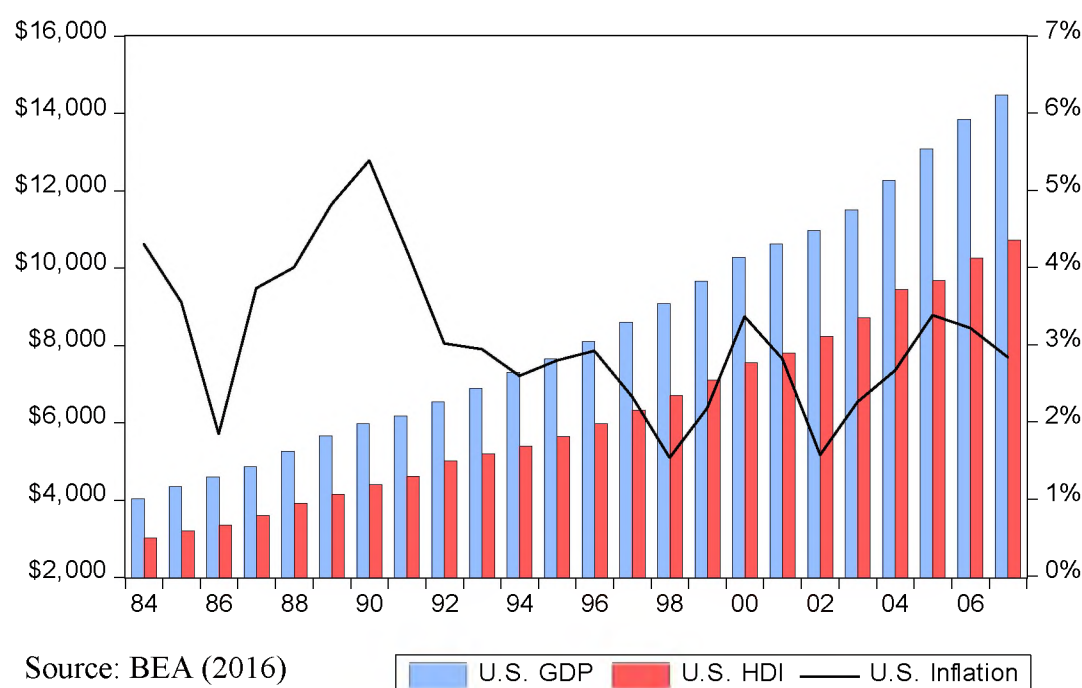
2.2.2 Better monetary policies

The theory underlying the better monetary policy argument is that the Federal Reserve Bank (the Fed) experienced a structural and / or policy change during the mid-1980s with the aim of stabilizing inflation; this would in turn assist in decreasing the volatility of GDP growth. Cecchetti *et al,* (2005) note that one of the actions taken by the Fed was a shift towards inflation targeting. It was believed that, by dedicating policy to achieving and sustaining a low and stable inflation, growth would improve. Summers (2005) argues this could result in a stable GDP growth trend through three channels: i) a stable inflationary environment will remove some uncertainty from the economy as lower actual inflation will result in lower expected inflation; ii) lower expected inflation will make policymakers more flexible when reacting to unexpected events; and iii) lower inflation will diminish the nominal distortions that arise, for example from taxation.

Clarida *et al.* (2000) concur that the policy change was important, but add that was due to a change in personnel (i.e. a change in the chairperson on the Fed); the fundamental change to the approach to monetary policy coincided with a change in the Fed's chairman in 1979. The pre-1979 approach was accommodative; inflation was not a specific target; one of the reasons for the adoption of this stance could be, as argued by Clarida *et al.* (2000), was a misguided assumption regarding the actual rate of unemployment (i.e. that the natural rate was less than what it actually was). Post-1979 the stance changed dramatically, in that a proactive stance

towards inflation targeting was taken by raising nominal (and real) short-term interest rates to combat high expected inflation. Comparing the pre- and post-1979 periods, it was found the former exhibited higher levels of instability, and this was attributed to the aforementioned change in personnel and the resultant change in the monetary policy. Clarida *et al.* (2000) find that this change provides a "natural explanation" for the stability in inflation that was experienced in the US post-1979.

Bernanke (2012) concurs with the view that better monetary policy helped decrease the volatility of inflation and stabilise GDP growth. The Taylor curve, which depicts the trade-off between output volatility and the volatility of inflation, is used. With improved monetary policy, the economy moves from an inefficient point (A) on the Taylor curve TC_1 to an efficient point (B) on another Taylor curve TC_2: this is depicted in figure 2.2 below.

Figure 2.2: Efficient Taylor Curve
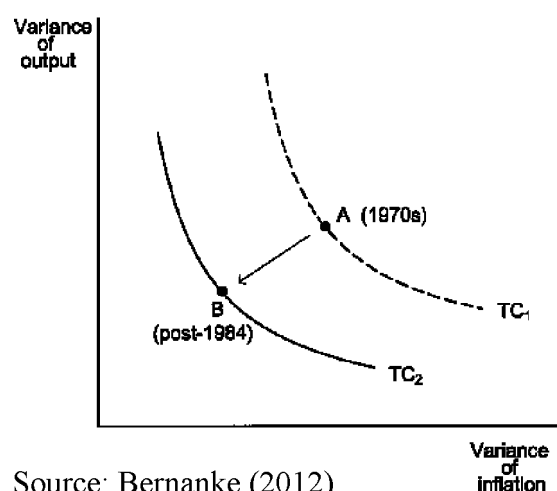
Source: Bernanke (2012)

Bernanke (2012) bases his argument on the premise that the monetary policy pre-1984 was inefficient; as policymakers would blame the volatility of inflation on cost-push shocks, for example, such as wage strikes, and increases in commodity prices. Bernanke (2012) and Clarida *et al.* (2000) concur that prior to the GM there was a period of high output volatility, arguing that this only ended with the implementation of the new monetary policy shifting the US economy from point A on TC_1 to point B on TC_2, heralding the beginning of the GM.

Taylor (2007) provides an alternative assessment of the role of monetary policy; while monetary policy did play an important role in stabilising inflation and assisted in creating an environment where the growth trend was less volatile, in the period from 2002 to 2005 the

policy rate was too low. This created an environment where the demand for housing and mortgage credit grew exponentially, with low short-term rates making finance inexpensive. Taylor (2007) notes that the growth in the demand for housing was associated with a surge in house-price inflation as well as a decline in delinquency and foreclosure rates on sub-prime mortgages.

When short-term rates returned to normal in 2006, a spike in foreclosure and delinquency rates occurred, culminating in a collapse of the sub-prime mortgage market (Taylor, 2007). The argument is that low interest rates led to an increase in household debt to the point where an increase in interest rates to a "normal" level, households could not make the required payments and defaulted on their loans. The collapse of the housing market is seen by many as being the precipitating event leading to the financial crisis in 2007/2008. Figure 2.3 depicts the relationship between the interest rate (right axis) and the amount of credit extended, in billions of dollars, to households (left axis) in the US for the period 1984 to 2007. A general decline in interest rates between 1984 and 2007 can be seen, and there were three instances where the decline became sharp. The figure lends support to the argument made by Taylor (2007); with generally declining interest rates the amount of credit extended to households increased, and the growth in credit extension continued even when interest rates (temporarily) increased.

Figure 2.3: U.S. Interest Rate and Household Credit, Annual Data 1984 to 2007

Source: Fed (2015)

U.S. Household Credit —— U.S. Interest Rate

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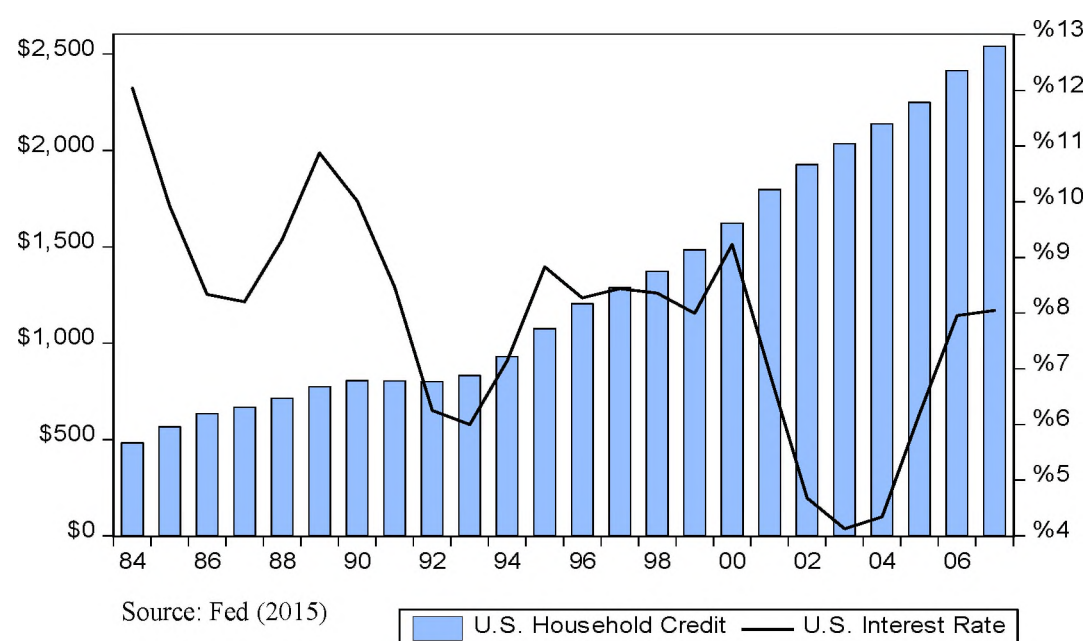
It is agreed that monetary policy played an important role in the late 20th century in that it controlled the inflation rate which resulted in increased certainty in the US financial markets and the economy in general. This increased certainty in the economic outlook, along with the low interest rate environment, persuaded households to increase their debt by taking out mortgage loans.

2.2.3 Good Luck

A further argument is the effect that smaller shocks (i.e. good luck) had on decreasing output volatility. This is founded on the idea that the GM was caused by a sharp decline in the volatility of exogenous disturbances affecting the US economy (Ahmed *et al.*, 2002). Summers (2005) adds that, for good luck to account for the GM internationally, it could only be a result of a lack of large adverse events affecting numerous countries at the same time, such as an oil price shock. Cecchetti *et al.* (2006), Clarida *et al.* (2000) and Kahn *et al.* (2002) found it to be difficult to separate the effect of the good luck theory from the others; it can be shown that the smaller shocks could be accounted for by better monetary policy and that policy makers could have dampened the effect of the shocks through their actions (Cecchetti *et al.*, 2006). It has also been found that improved inventory management could also account for smaller shocks to the economy as it will assist to help decrease the effect of exogenous shocks (McConnell and Kahn, 2005).

Ahmed *et al.* (2002) tested the hypothesis that the decline in GDP volatility was caused by the effect of smaller shocks and found good luck to be the main cause of the GM. Results from a contributing analysis were not, however, as conclusive and it was acknowledged that none of the other explanations could be ruled out. Ahmed *et al.* (2002) conclude that, if the GM was caused by smaller shocks and not a structural or policy change, then it is possible to assume that the period of stable growth would come to an end as policy makers cannot control the effect that exogenous shocks have on the economy. Nakov and Pescatori (2007) disagree with Ahmed *et al.* (2002); each different explanation for the period of stability contributed to either decreased volatility of the inflation rate or the GDP growth rate; this stability could thus not have been the result of good luck.

As stated earlier, it was the stabilisation of GDP and inflation that increased certainty in the economic outlook and in the financial markets; this allowed households to decrease their precautionary savings and increase their debt to exorbitant levels in the belief that this period of stability would never end.

2.2.4 Financial innovation

Frame and White (2002) define financial innovation as something new that decreases costs and risk, or improves a product/service/instrument to better satisfy consumer demand. It is argued by some that financial innovation could account for the GM. The core of this argument is that an increase in credit demand by firms and by households would allow both to smooth consumption and production cycles, resulting in a decline in GDP volatility. (Cecchetti *et al.*, 2006; Dynan *et al.*, 2005; Bezemer and Grydaki, 2012).

Dynan *et al.* (2005) argue that better risk assessment, increased lending, securitization of loans and the development of an active secondary market improved the households' ability to borrow. This was accompanied by changes in government policy, for example the phasing out of Regulation Q, which curbed bank lending when interest rates increased. Bezemer (2009) agrees with Dynan *et al.* (2005), stating that this process of "deregulation" was continued when the Glass-Steagall Act was repealed in the late 20th century. The removal of the Act allowed banks to make loans and then sell the loan deal to a third party, thereby decreasing the bank's risk.

Dynan *et al.* (2005) also examine the broad trends of how the financial system has developed. These include technological advances that assist banks in assessing the creditworthiness of clients and the development of a secondary market for loans which, *inter alia*, assisted in the creation of junk bonds. Junk bonds were a crucial development as they allowed lesser known firms to raise funds with ease and at a relatively low cost (Bean 2010). Changes in households' behaviour and attitude toward credit were noted; there was an increase in the ratio of household debt-to-disposable income as well as an exponential increase in the amount of bankruptcy filings. The increase in the amount of credit extended and the household DTI are shown in figure 2.4.overleaf. It demonstrates a distinct change in the behaviour of households towards credit, with the amount increasing throughout the period. There is also a fairly strong positive relationship between the amount of credit extended to households (left axis) and household debt-to-disposable income (right axis).

Figure 2.4: Growth in U.S. Household Credit and Household Debt-To-Income Ratio, Annual Data 1984 to 2007

Source: Fed (2015)   —— U.S. DTI   ▨ U.S. Household Credit
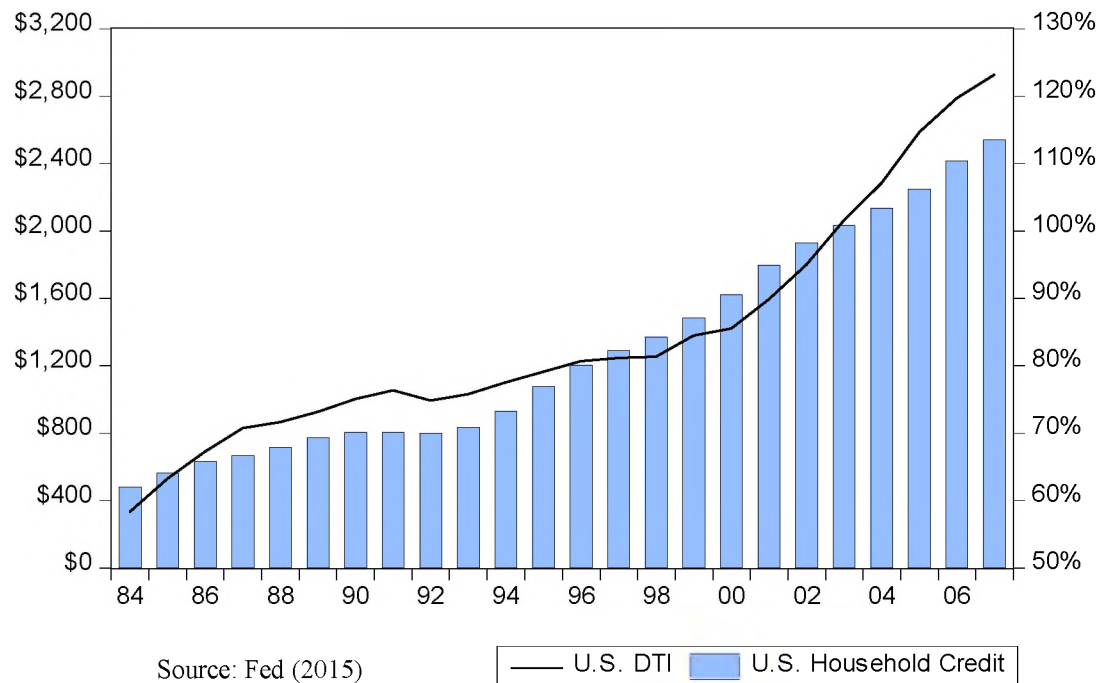
Dynan *et al.* (2005) argue that these trends, alongside the changes in government policy, have resulted in an increase in the number of households and firms with access to credit, as well as the ability of banks and other financial institutions to offer new products (e.g. Collateralized Debt Obligation (CDOs)). Bezemer and Grydaki (2012) agree that financial innovation did play a part in the GM, finding that the start of the GM coincided with an increase in credit supply, an upswing in household income and an increase in the proportion of consumption to GDP. Figure 2.5 supports the argument made by Bezemer and Grydaki (2012) as it depicts the growth in U.S. consumption and HDI (left axis) and the amount of credit extended to households (right axis) for the period 1984 until 2007. The figure indicates that the growth rate in credit extended to households was greater than that of US consumption and HDI. With the increased access to credit enabled by financial innovation there was a surge in the amount of credit granted to households, and in the later years it started to outstrip the growth in HDI; credit had evolved from a product that could be used in times of economic stress to a product that increased HDI and thus supported household consumption, enabling them to live beyond their current means.

Figure 2.5: Growth in U.S. Consumption, HDI and Household Credit, Annual Data 1984 to 2007
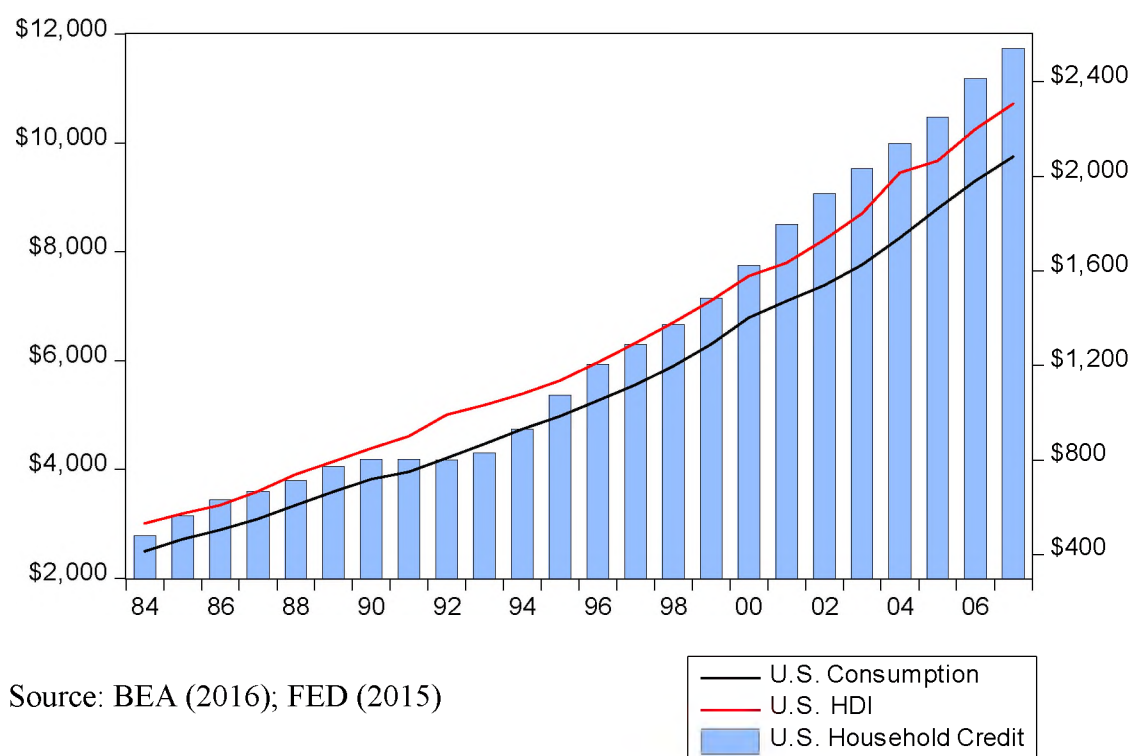
Source: BEA (2016); FED (2015)

Bean (2010) agrees, arguing that the low interest rate and seemingly low risk environment (i.e. low uncertainty regarding the economic outlook of the US) enticed financial institutions into increasing the amount of loans granted without a concomitant increase in share capital. Bezemer and Grydaki (2012) found that there was an increase in the amount of economic activity being financed by debt from 1984 onwards, and that debt-financed incomes moved more smoothly than other components of GDP, leading to a decline in the volatility of the GDP growth rate.

The theme of the argument is that there was a period of deregulation that led to an increase in the amount of credit (both supplied and demanded), allowing consumers to smooth their consumption cycle when hit by an income shock (i.e. the increase in credit allowed consumers to stay at a desired level of consumption even when household income decreased) (Clark, 2009). In other words, deregulation of the financial market in the U.S. allowed financial institutions to increase the amount of credit extended to households and households to smooth their consumption cycle by increasing the amount of debt they took on.

A key issue that can be drawn from the above is that the increased stability in both inflation and GDP growth could not have been sustained for the period it did without each of the factors contributing; each factor both assisted in the formation of the GM and persisted throughout the period. It was this persistence which allowed the GM to continue for the length of time it did. Both banks and households took advantage of the financial deregulation and improved macroeconomic outlook by the banks increasing the amount of credit that they granted (mainly in the form of mortgage loans) and sold the risk on using Collateralised Debt Obligations (CDO's). Households increased the amount of credit demanded as they sought to increase their level of consumption through debt financing and mortgaging their houses. The next section will discuss how this environment culminated in the financial crisis in the US.

2.3 The Financial Crisis in the U.S.

This section examines the literature regarding how the 2007/2008 financial crisis in the US developed. It may be argued that the prolonged period of credit growth on the back of sub-prime loans was an underlying factor, if not the foundation, of the financial crisis.

2.3.1 The causes and effects of the financial crisis

White (2006) warned that, due to the huge structural and policy changes that the US economy had experienced over the preceding two decades, there had been a move away from the highly regulated structure following the Second World War to a structure built on financial deregulation and liberalisation. It was argued that, if changes to current policies were not made, the credit / asset-price boom that had been building up was simultaneously storing up trouble for future. Acharya et al., (2009) note that the warning proved to be true one year later as the housing market went bust on the back of defaulting sub-prime loans. It was further argued that, while this was the root cause of what was to become systemic failure, the most distinguishable event was the collapse of two hedge funds managed by Bear Stearns due to deteriorating prices of the CDO's which were saturated with sub-prime mortgages. Falling prices led to lenders demanding more collateral; this went so far as them try to seize and sell off some of the fund's assets. While Bear Stearns put a stop to this, the damage had already been done with the two hedge funds losing over 90% of their value. This is also arguably the proximate cause of a subsequent repricing of all credit instruments and an almost complete cessation of the issuance of CDO's. This led to the next major event when BNP Paribas had

to suspend redemptions to stop the run on the assets of three of their structured investment vehicles (SIV's). Acharya *et al.* (2009) maintain that this step essentially froze the asset-backed commercial paper market as it became clear to investors that the SIV's (which were backed by defaulting sub-prime mortgages and other risky credit) were not necessarily safe. With the conflated nature of the financial sector investors could not differentiate between the healthy and the toxic; the FC had become systemic.

Bean (2010) argues that a number of incentive distortions and information problems played a key role in the FC. In theory, it is expected that the return on debt is an increasing function of leverage (i.e. there should be no gain from increasing the debt-to-equity or leverage ratio). However, prior to the FC, banks were found to have increased their leverage ratios for two reasons: Firstly, households had increased the amount of debt they held; rising incomes exacerbated the situation and households demanded more credit so that higher level of consumption could be maintained. Secondly, banks believed they were "too big to fail" in that if they did go bankrupt the central bank would save them by injecting liquidity into their balance sheet (Bean, 2010). As a result of these two factors there was a lower perceived uncertainty associated with making loans, enabling banks to conduct reckless lending in pursuit of more profit.

The securitisation of loans and sale of CDO's, according to Bean (2010), exacerbated the incentive for a bank to increase its leverage ratio as it allowed banks to on-sell loans along with the associated risk, and thereby allow banks to leverage more loans off their capital. When the FC hit, banks that were highly leveraged were especially vulnerable. Clark (2009) concurs, arguing that it was the preconditions (causes) that initiated and sustained the GM that created the environment in which the FC occurred. For example, low interest rates created an environment where both banks and households took part in reckless borrowing and lending, increasing the vulnerability of the sector. This is illustrated in the figure 2.6 below: both the amount of credit extended and household debt-to-disposable income increased rapidly during the early 2000s with households' debt-to-disposable income rising to almost 125%. Households found themselves in a debt trap; every $100 of disposable income had to cover $125 worth of debt, necessitating taking on more debt to pay existing debt. Households were very vulnerable when the FC hit as banks decreased the supply and ease of access to loans, making it difficult for households to make the required payments. Banks suffered as they experienced decreased loan repayments (an increase in defaults) and households were

impacted as they could no longer sustain current consumption levels as both the access to credit and income decreased.

Figure 2.6: Comparison of Credit Extended to U.S. Households and Household Debt-To-Income Ratio, Annual Data from 2000 until 2010

Source: FED (2015)
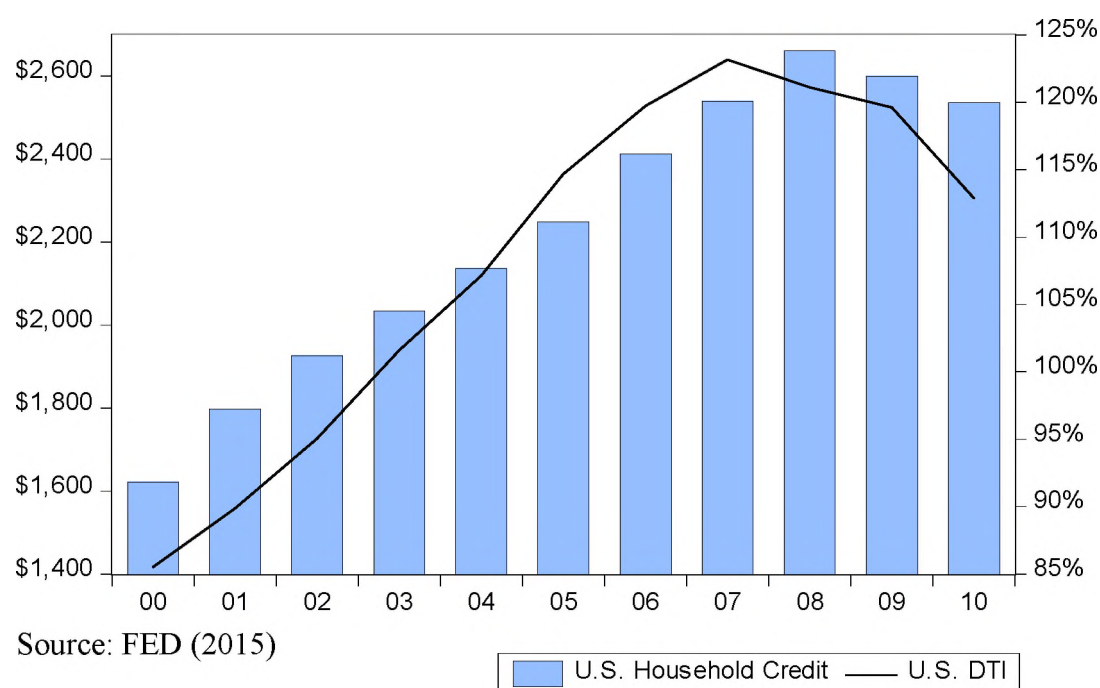
Bean (2010) argues that the effect of the FC was amplified by its impact on the real sector, maintaining that one of the obvious ways that the FC spread to the real sector was through a 'credit crunch'. This was as a result of banks tightening their lending standards, restricting the supply of credit to businesses and households. According to Bean (2010) banks decreased the supply of credit for two reasons: Firstly, they realised they were under-pricing risk and secondly, that they were excessively highly leveraged. Reinhart and Rogoff (2009) consider the main reason the FC had such a large effect on GDP to be the fact that the FC's effect on the financial sector resulted in increased uncertainty towards the financial sector, leading to an increase in precautionary savings, the suspension of investment ventures and a reduction of business activities. This in turn led to a weakening of the GDP. This view is supported by the IMF (2008) and Furceri and Mourougane (2009) who show that the FC severely impacted both business cycles and output.

2.4 Conclusion

This chapter analysed various arguments and theories regarding the GM, the 2007/2008 FC and the effects thereof in the US. The causes of the GM were considered with a focus on how they led to and sustained an environment of macroeconomic stability, allowing the amount of credit granted by banks and household debt to increase. This was exacerbated by deregulation of the financial markets, which contributed to further increases in the amount of credit extended to, and demanded by, households. The next chapter focuses on credit extension and household debt in South Africa.

CHAPTER 3: CREDIT EXTENSION AND HOUSEHOLD DEBT IN SOUTH AFRICA

3.1 Introduction

This chapter investigates credit extension in South Africa by examining how the effects of the GM were experienced in South Africa, the effect of the FC on South Africa, the growth in unsecured lending and household debt in South Africa. The causes and effects of the GM and FC on South Africa are considered to contextualise the growth of credit extension in South Africa over the period. The shift to, and growth of, the unsecured lending market is discussed, as well as the concerns that were raised due to the exponential growth of the market. Finally, increasing levels of household debt in South Africa are set against the possibility of a looming debt crisis and the bankruptcy of ABIL. The chapter is structured as follows: section 3.2 discusses the GM in South Africa and how it created an environment that saw an increase in the amount of credit extended to households. Section 3.3 investigates how the FC that started in the US affected the South African economy. Section 3.4 examines the growth in the unsecured lending market in South Africa and how it led to the bankruptcy of ABIL. Section 3.5 discusses household indebtedness in South Africa by considering the possibility that South Africa is in a debt crisis. Section 3.6 concludes.

3.2 The Great Moderation in South Africa

Burger (2008) examined the volatility of the South African business cycle to establish whether or not South Africa experienced a similar decline in GDP volatility as the US and other developed countries and, if so, what the causes were. It was found that the volatility in South Africa's GDP decreased, starting in the mid-90s. Better monetary policy was found to be the predominant causal which played a role in reducing the volatility of GDP growth. This supports earlier work done by Du Plessis *et al.* (2007) who found that monetary policy had been largely countercyclical since 1994. This suggests that better monetary policy (a policy of inflation targeting) contributed to the decline in GDP volatility. As with the US, the decrease in the volatility of GDP growth and the inflation rate led to a decrease in the level of uncertainty, allowing households to decrease their precautionary savings and increase consumption. The subsequent increase in household income could not, however, sustain both the increased consumption and debt servicing, resulting in households taking on more debt to fund existing debt. Figure 3.1 illustrates this with a plot of South African GDP, the amount of

credit extended to the private sector (left axis), the South African inflation rate and Household debt-to-disposable income ratio (right axis) for the period 1995 to 2014. What is evident from the figure is the relative stability of the inflation rate and the stable growth trend of GDP. A positive relationship between credit extended and household DTI is evident, indicating that households took on more debt while income remained relatively constant. Finally, it is apparent that, while inflation and the GDP growth trend in South Africa remained constant, there was an increase in the amount of credit extended.

Figure 3.1: South African GDP, Inflation Rate, debt-to-disposable income and Amount of Credit Extended to the Private Sector, Annual Data 1995 until 2014

Source: SARB (2015)
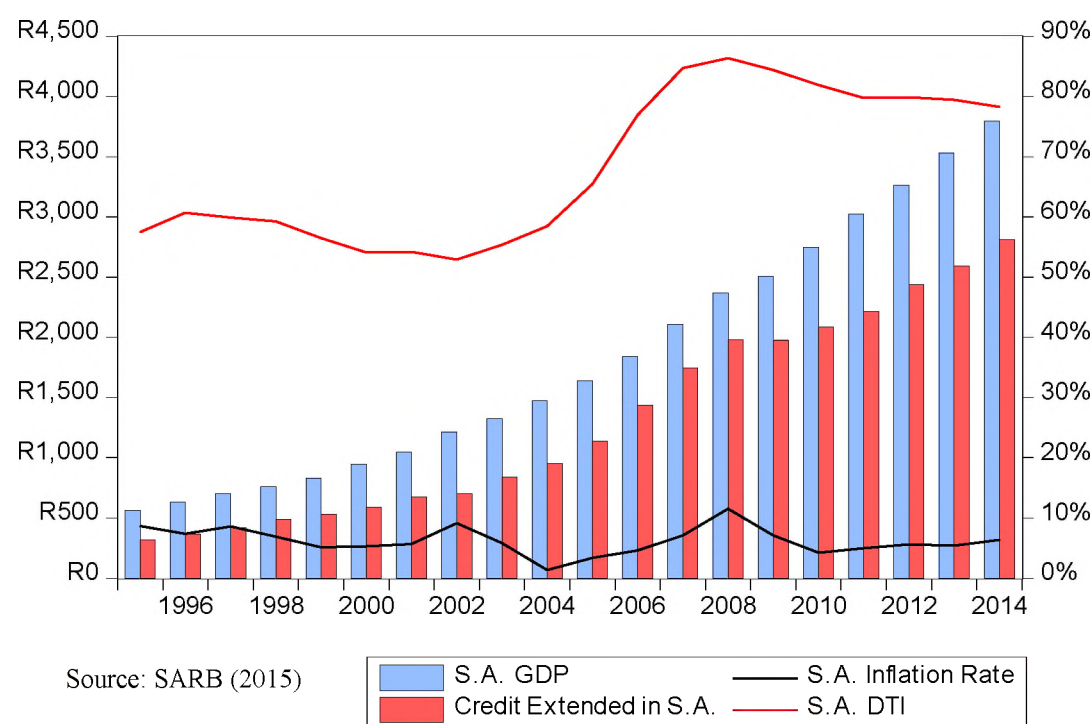
Burger (2008) also investigated the relationship between real household debt and real durable consumption. The argument underlying this analysis is that improvements in the financial sector, as well as financial deregulation, meant that households could become less liquidity-constrained and better able to manage their balance sheets (less vulnerable to adverse shocks). Burger (2008) found that increased household debt resulted in smoother durable consumption which assisted in the smoothing of the business cycle.

Two important factors that are brought to light in the literature regarding South Africa and the GM are the impact of the political situation in SA over the period and the importance of

the link to the global economy. Both Du Plessis *et al.* (2007) and Burger (2008) found that the period between the Soweto riots in June 1976 and the abolition of the apartheid regime in April 1994 to be one of high political instability, which resulted in high volatility in the South African economy as the level of uncertainty regarding South Africa and its future was high. The impact of political situation on the South African economy is further explained by Du Plessis and Kotze (2012), who argue that a change to monetary policy and capital controls, from a direct to a market-orientated approach, made the South African economy more vulnerable to the adverse shocks that occurred as a result of trade and financial sanctions placed on South Africa after the 'Rubicon' speech in 1985. It was also found that South Africa's foreign debt (most of it short-term) had more than doubled during a five year period to over 50% of GDP by 1985; servicing of the debt became increasingly difficult as the rand depreciated due to the aforementioned sanctions and political tensions.

It would appear that there is a link between the South African and global economy and that this had a significant effect on South Africa's economic fortunes. This is highlighted by Du Plessis and Kotze (2012), who argue that South Africa's progress toward a stable GDP growth path and low and stable inflation was halted by the trade and financial sanctions imposed by most of the developed countries. These issues are significant as they help explain not only how the effect of the GM was felt in South Africa, but also why they were only experienced in the mid-1990s after the sanctions were lifted.

The next section examines how the global financial crisis affected the South African economy.

3.3 The Effects of the Financial Crisis in South Africa

Bean (2010) argued that it was through financial liberalisation that both the effect of the FC in the US and the resultant demand shock spread globally. This section discusses the spread of the FC, specifically as it affected South Africa. It appears from the literature that South Africa was not directly affected by the financial crisis, but rather indirectly through subsequent effects on GDP and the ensuing increase in government expenditure and budget deficits.

Griffith-Jones and Ocampo (2009) argued that the transmission channel through which the FC affected developing countries was not through the financial sector, but rather through the real sector. Taylor (2007) and Frank and Hesse (2009) agreed, stating that the effect on

developing countries' financial sector was diminished due to them having made improvements to monetary and fiscal policies, were holding large levels of foreign exchange reserves and had low levels of foreign debt. The effect of the FC on developing countries was due to falling commodity prices, which declined sharply as international credit extension declined and demand dropped. The decrease in credit extension left households with no way to maintain desired consumption level as HDI decreased with a declining GDP. This resulted in a decrease in demand for commodities, leading to a rapid decrease in commodity prices.

Frank and Hesse (2009) argued that the FC saw global risk aversion increase rapidly, individual country's asset markets decline, and the unwinding of carry trades resulted in the depreciation of many emerging markets currencies. This problem was exacerbated by the interconnectedness between the global financial markets; increased risk aversion also resulted in cash flow problems for emerging markets as investors pulled money out, decreased foreign direct investment (FDI) in emerging markets, and sought to invest in what were perceived to be "safer" and more liquid developed markets (e.g. the U.S. Treasury bills) (Areetey and Ackah, 2011).

Baxter (2011) investigated the effect of the FC on South Africa by focusing on the impact on the mining industry. Results supported those of both Frank and Hesse (2009) and Griffith-Jones and Ocampo (2009); as a result of the effect of the FC on the developed countries' GDP their demand decreased, directly affecting exports of South Africa's primary commodities. This was aggravated by a subsequent fall in commodity prices. This is illustrated in figure 3.2, which shows the average price of various metals such as: copper, zinc, aluminium, and iron ore. The fall in commodity prices resulted in a decline in investment in the sectors affected and thus a decrease in South Africa's overall GDP growth rate.

Figure 3.2: The Economist's Metal Index in dollar terms, indexed from October 2001 until March 2009

Source: Baxter (2011)

While the South African financial sector was initially insulated (to an extent) from the international financial problems, the impact was felt later. Madabeko (2010) argued that the South African banking sector was affected by the ensuing global 'credit crunch' which resulted in, as mentioned above, banks tightening their already tight lending standards. Kershoff (2009) adds that this started a vicious cycle, where the decline in credit resulted in a decline in consumer spending, which led to a decrease in investment and consequently an increase in unemployment, which led to banks tightening their lending standards even further and an overall decline in GDP. The persistence of the FC in developed countries, coupled with an increase in risk aversion, had a negative impact in a number of areas. Capital outflows led to a R/$ depreciation and pressure on the inflation rate. Falling export earnings led to a worsening of the current account deficit, and increased government expenditure to an increasingly larger budget deficit.

The tightening of lending standards by the banks, while it had an effect, did not lead to as much of a decline in short-term and unsecured credit as may have been expected. Figure 3.3 overleaf shows the proportion of different credit types (left axis) to the rand value of total credit granted (right axis) for the period 2007Q4 until 2008Q4 (the start of the FC). Mortgage and secured credit decreased from over 53% of R103 billion to just over 47% of R67 billion

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and over 32% of R103 billion to just over 22% of R67 billion. While, unsecured and short-term credit increased during the same period from just over 7% of R103 billion to almost 8% of R67 billion, and short term credit increased by a similar amount (NCR, 2015a). What this shows is a move by consumers away from the secured credit market to the unsecured credit market.

Figure 3.3: Percentage Proportion of Credit Types Granted to Total Credit Granted, Quarterly Data 2007Q4 until 2008Q4
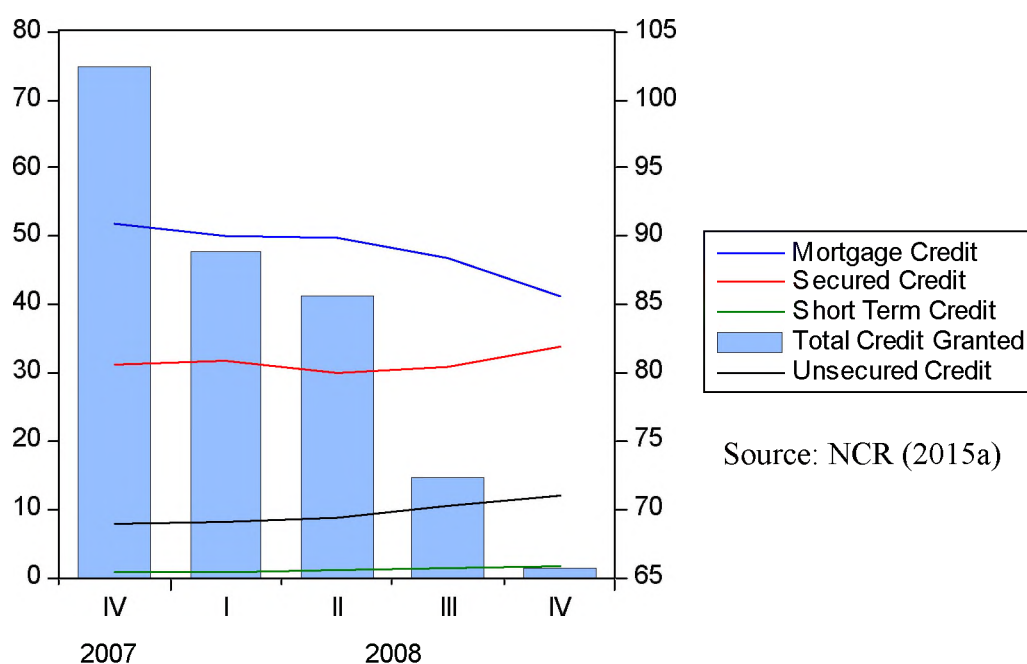
Source: NCR (2015a)

Over the following years the unsecured credit market was to experience a period of excessive growth. It was due to this growth in a relatively unregulated market, as well as market conditions in South Africa, that led to concerns being raised regarding the stability of the unsecured lending market and the effect it would have were it to crash.

3.4 The Growth in Unsecured Lending and Bankruptcy of African Bank Investments Limited

This section discusses the growth in the unsecured lending market since 2007, what caused this growth and how it could have caused the bankruptcy of ABIL.

3.4.1 Unsecured lending

The major difference between an unsecured loan and a secured loan is that when a borrower takes out a secured loan, the bank or financial institution requires a form of collateral to cover the risk that the borrower could default on the payment of the loan (NCA, 2006). The collateral is normally a real asset that the borrower owns (e.g. a house). Prinsloo (2002) states that an unsecured loan differs from this in that when a borrower takes out an unsecured loan the borrower does not have to pledge any collateral to cover the debt/lender should the borrower default on the payment of the loan. The consequence of this is that unsecured lending is far riskier to lenders than secured lending, as the sale of the debtors' assets (e.g. house) is used to offset all/part of the overdue debt. To counter this higher risk, banks charge a higher interest rate thus making unsecured lending more expensive to the consumer (Colombo, 2014; Gomez, 2013).

Dlamini (2013) separates unsecured loans into three different types: credit facilities, short-term credit, and unsecured credit. Each type covers a different part of the unsecured market, with unsecured credit covering any credit transaction where the borrower does not pledge security (excluding credit facilities and short-term credit). The NCA (2006) explains that the maximum interest rate (i.e. the interest rate cap) that can be charged for this type of loan is the repo rate multiplied by 2.2 plus an additional 20% per annum. Using this information the current interest rate cap for an unsecured loan is calculated as 33.75% per annum.

3.4.2 Recent growth in the unsecured lending market

It could be argued that, when the financial crisis hit South Africa, the exuberance towards the lending market did not stop; it merely shifted between the secured and the unsecured markets. Viedge (2012) argued that there are various demand and supply side factors behind this shift. The first demand side factor proposed is that demand for unsecured credit is driven by middle income earners. Viedge (2012) quotes statistics from the National Credit Regulator (NCR)

which indicates that household earnings of more than R7500 per month accounted for 69% of all unsecured loans at the end of 2011. The second demand side factor is that there has been an increase in access to credit; due to the marketing drive undertaken by all of the major banks there was an increase in the access to credit and a subsequent increase in households' appetite for credit. Gomez (2013) agrees, stating that unsecured credit allowed poor households obtain credit and thereby decrease their liquidity constraints. The NCR (2012a) also states that the implementation of the NCA assisted in increasing the demand for unsecured credit as it allowed consumers, who did not have the assets that could be secured against a loan, access to credit. The final demand side factor is the increase in debt consolidation, where borrowers are permitted to have one loan instead of multiple loans and improved monthly cash flow. Both these factors contributed to an increase in the demand for unsecured loans.

Theobald (2013) agrees that the consolidation of loans did play a part in the growth of the market, but adds that the increasing wage rate of low and middle income earners also played a role in allowing those earners to acquire larger loans than was previously the case. Viedge (2012) argues that there was only one major supply side factor – the implementation of the NCA. It was argued that the NCA made unsecured credit more attractive to financial institutions than secured credit. This was due to the fact that the NCA increased the loan size and repayment period for unsecured loans, which attracted more borrowers and resulted in increased profitability for the institutions. Furthermore, this occurred while the secured credit market recorded a decline in returns due to its association with the FC. Theobald (2013) agrees, stating that the implementation of the NCA removed the interest rate cap that was placed on unsecured lending by the Usury Act and created a space in the market for larger unsecured loans to be offered. The aversion towards mortgage lending and the loosening of some of the restrictions on the unsecured lending market resulted in some consumers moving from the secured lending market to the unsecured lending market (Theobald, 2013; NCR, 2012b; Fakir, 2014). In other words, deregulation of certain aspects of the financial market allowed for easier access to credit for low to middle income households, thereby increasing the amount of credit extended to households.

It was due to these factors that the unsecured lending market grew and evolved from a microloan market into a large credit market (Theobald, 2013). Figure 3.4 overleaf depicts the rand value growth in unsecured loans for the period 2007 to 2015. It shows the rapid increase in the rand value of the unsecured lending market, which grew from R11 billion to almost

R30 billion between 2010 and 2012, equating to a 172.73% increase in the value of the market over two years.

Figure 3.4: Growth in Unsecured Loans (Rand Value, Thousands), Quarterly Data from 2007Q4 until 2015Q2

Source: NCR (2015a)
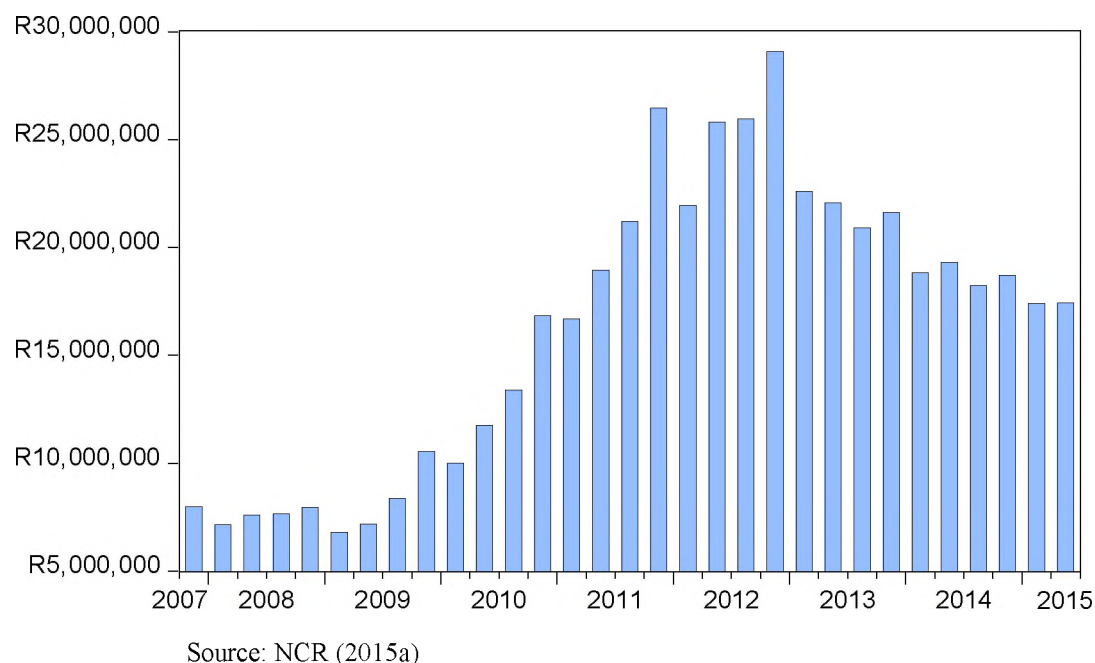
McLachlan (2012) analyses the growth in the unsecured lending market through the total number of loans; the number of unsecured loans grew by an average of 38% quarter-on-quarter and the average amount and duration of the loan increased from R8 344 for 662 days to R16 230 for 796 days. This is corroborated by Duncan (2013) who states that the number of unsecured loans increased from 700 000 in the first quarter of 2010 to over 1.6m at the end of 2012. Gomez (2013) concurs, stating that there was a year-on-year growth of 49.4% between 2011Q1 and 2012Q1.

Gomez (2013) investigates how the growth in unsecured credit affected the profitability, liquidity and bad debts of the six major commercial banks in South Africa. It was found, with regards to bad debts, that there is an overall positive relationship between the growth in unsecured credit and the amount of bad debts (i.e. the increase in unsecured credit has resulted in an increase in defaults). This is shown in figure 3.5 below where impaired records (i.e. bad debts) indicates the number of households that are late on their payments by three months or more and the households who are in adverse listing (i.e. the households have more

than one loan outstanding and at least one is more than three months late on payments). What is apparent from the graph is the excessive growth in the rand value of unsecured loans (left axis) and its positive relationship with the number of impaired records (right axis).

Figure 3.5: Growth in Unsecured Loans (Thousands) and Impaired Records (Thousands), from 2007Q4 until 2015Q2

Source: NCR (2015a; 2015b)
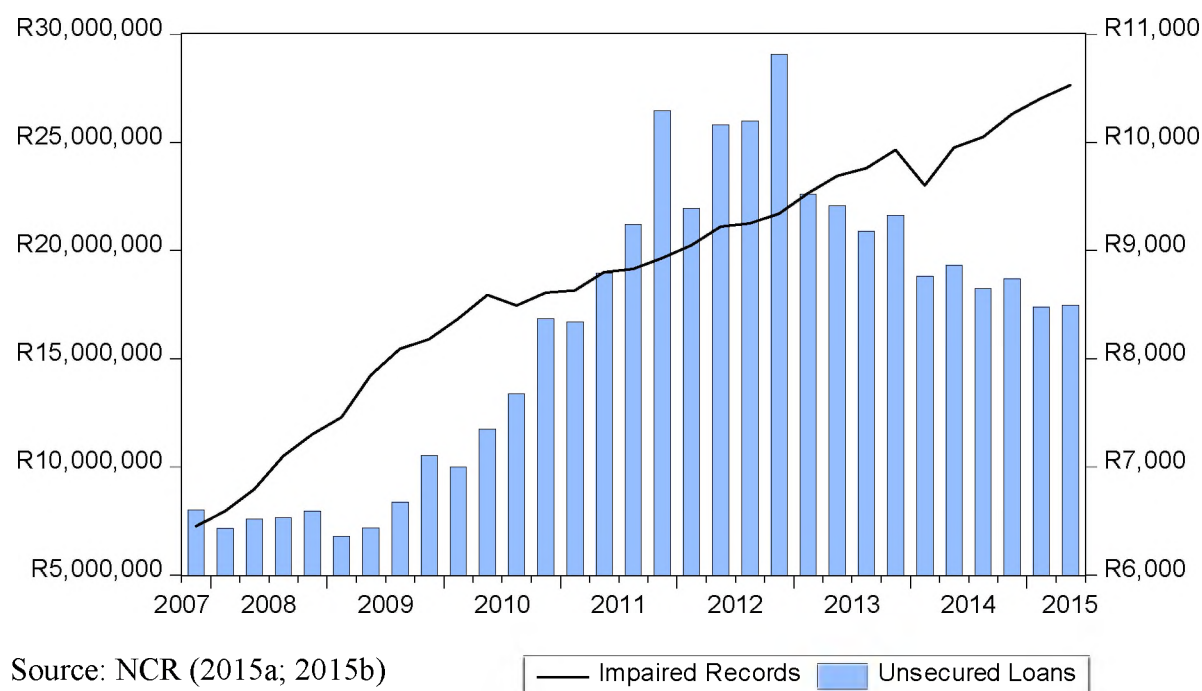
Theobald (2013) affirms that in 2012 senior executives at ABIL first raised the alarm regarding the growth of the unsecured lending market and the worrying trend of the number of defaults. The next section will investigate the concerns raised regarding the unsecured lending market.

3.4.3 Concerns regarding the unsecured lending market

Dlamini (2013) summarises the four major concerns raised by regulators and government agencies (e.g. SARB). Firstly, there seemed to be an absence of clearly defined affordability measures and standards for issuing loans. This concern is supported by two reports conducted by the NCR (2012a; 2012b), which note that the requirements for affordability testing put forward in the NCA are vague (NCR, 2012a). It is further noted that, due to the fact that the health of unsecured loans relies on borrowers' ability to service the loans, and given that

there is no security to back the loan, as long as good affordability assessments are being conducted there should be no cause for concern. However, NCR (2012a) states that credit providers can make any excuse as to the assessment done, due to the vagueness of the NCA on this matter. This is a concern because it can lead to reckless lending as insufficient affordability tests are conducted.

The second major concern noted by Dlamini (2013) is that interest rates charged were too high. This was corroborated by the NCR (2012a) which reports that the high interest rate could be contributing to the increased number of defaults. This problem is, however, currently being addressed; Barry (2015) states that a recent draft has been submitted by the NCR to the Department of Trade and Industry proposing recommendations to decrease the interest rate cap charged on loans, with that on unsecured loans decreasing by nearly 8%. This reduction in the interest rate charged should reduce the number of defaults, but it will also decrease the supply of credit, due to the reduction in yield. The third concern Dlamini (2013) regards is credit life insurance. Dlamini (2013) stated that this type of insurance meant that, in the event of the borrower's death, when it comes to liquidating assets, the outstanding debt is paid off first. Dlamini (2013) argued that to be a concern as providers could be charging high rates with low benefits. Shand (2013) agreed, stating that, due to the fact that credit life insurance is more expensive than other life policies, and that there is a low claims ratio while a high expense ratio (calculated by dividing total operating costs by the average total value of the credit life insurance), means that credit life insurance serves the interest of the lender and not the borrower.

The final major concern that Dlamini (2013) notes is that consumers need to be educated regarding how loans work. This is corroborated by Barry (2015), citing the CEO of MicroFinance South Africa (MFSA), who states that the level of defaults is a positive function of financial illiteracy. This concern is further supported in a report published by the NCR (2012a) which states that some borrowers only consider repayment of loan instalment as the cost for the loan and do not take into account the interest rate cost as well as other administrative costs. Theobald (2013) concurs stating that the NCA is silent on other charges that could be levied against the borrower. Thus the actual repayment of the loan (for the borrower) and profitability of the loan (for the lender) could be higher than the interest rate charged. Theobald (2013) states that the additional charges can be levied against the borrower include initiation fees and insurance charges and that these extra charges are generally enforced.

A concern raised by Mutezo (2014) is that household debt is used to finance durable consumer goods and services and to keep consumption at desired levels when a drop in income is experienced. This follows the theory put forward by Krugman (2007) who states that the recent trend in credit usage has occurred at the same time as an increase in income inequality. Thus, consumers use credit to achieve a level of consumption that would not be available to them without it. This is supported by the NCR (2012a), which states that loans are being used to finance consumption expenditure. Furthermore, Mutezo (2014) states that household debt has increased faster than household income which equates to household DTI ratio of around 80% from 2007 until 2013 from a base of less than 60% in 1995; for that seven year period roughly 80c per rand of income has been used to finance debt. This is a concern because a high level of debt raises a households vulnerability to shocks, especially shocks to income, as it decreases the households ability to adjust to the shock, whether it is expected or not.

Butters (2013), Adewale (2014) and Fakir (2014) show, using data released by the NCR, that total outstanding unsecured credit increased from R41 billion in 2007 to R159 billion by the end of 2012, a growth rate of over 287% in six years. Further, in late 2012, over 9 million consumers in the unsecured lending market were late on their payments, equating to almost half of the consumers in the total loans market. The NCR (2012a) states that the impairment level of the credit records of the South Africans active in the credit market is nearing 50%.

Finally, amid the growing concerns regarding the unsecured lending market it became apparent that economic conditions in South Africa was worsening, which has a direct effect on the ability of consumers to repay their loans (Dolan and Motsoeneng, 2014; Cameron, 2014). The worsening of market conditions in South Africa and its effect on the unsecured lending market, along with the growing concerns regarding the market, resulted in the major banks decreasing their risk in the market by increasing their provisions (Theobald, 2013). Dolan and Motsoeneng (2014) state that this resulted in a decrease in the growth and value of the unsecured lending markets that started in 2013Q1. Figure 3.6 (overleaf) illustrates this decrease in the rand value of the unsecured lending market, which declined from over R26 billion in 2011Q3 to less than R17.5 billion in 2015Q2, a decrease of over 34% of the market value in less than four years.

Figure 3.6: Decline of the Unsecured Lending Market (Rand Value, Thousands), Quarterly Data 2011Q3 until 2015Q2

Source: NCR (2015a)
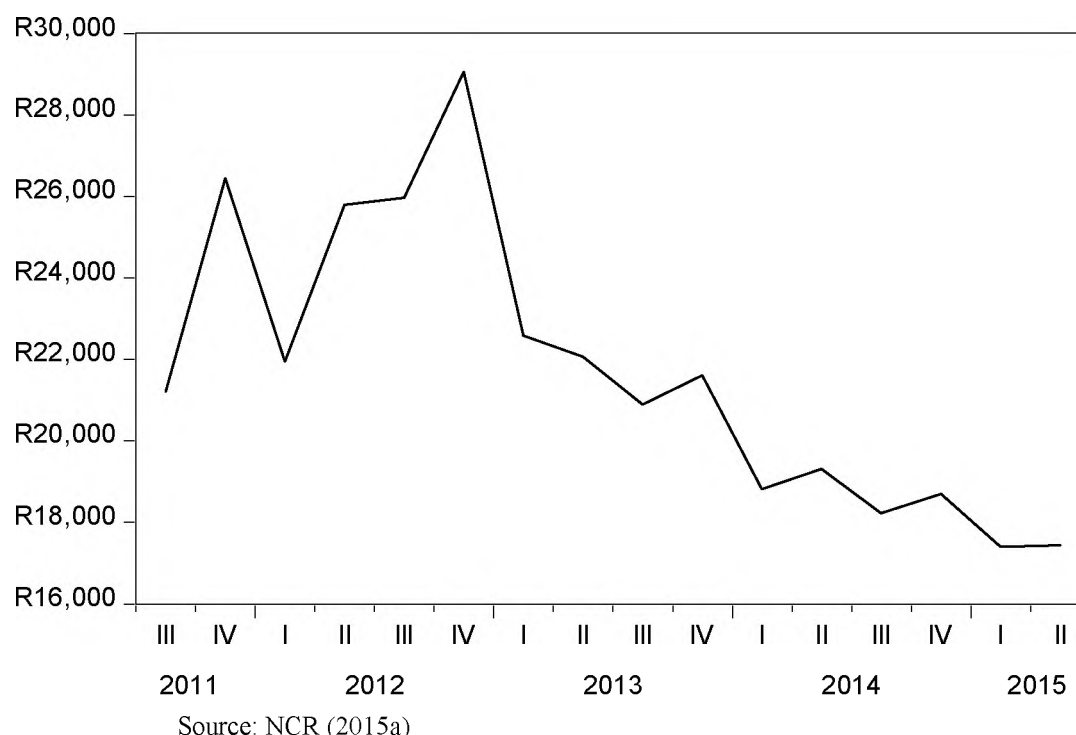
Furthermore, the NCR (2013) stated that it was increasing its regulation of the NCA with the aim to stop the abuse of consumers by lenders; the decrease in the supply of credit was accompanied by an increase in the regulation of the market.

Many concerns regarding the unsecured lending market have been raised these range from the affordability of credit to reckless lending and include a consumer base that is financially illiterate. These concerns are made even more significant amid a worsening economy as it reduces the consumer's ability to make the required debt payments, due to, amongst other factors, a reduced income. The next section will investigate the biggest financial institution involved in the unsecured lending market (ABIL) and discuss how the effects of the decreased growth in the market and increased regulation of the market, along with other factors, resulted in it going bankrupt.

3.4.4 The fall of African Bank Investments Limited

Within the context of the growth of the unsecured lending market ABIL played an important role, in that it maintained the largest percentage share of the unsecured lending market (32%), while other banks, in terms market share, had far less with Capitec (17%) and Standard Bank

(16%) being ABIL's closest competitors (Dlamini, 2013). Furthermore, unlike the other commercial banks, ABIL's finance model channelled savings, earnings on bonds as well as investments of individuals and institutions placed with it into the provision of unsecured loans for its customers (African Bank, 2013; Theobald, 2013; Bonorchis, 2014). According to Bonorchis (2014) the major drawback of this business model was that it was not diversified, making ABIL vulnerable to changes in the market and/or economy. The business model differentiated ABIL from other commercial banks that had a more diversified source of income, a more conservative risk appetite and whose major source of funding came from retail deposits (Donnelly, 2014). Gomez (2013) argues that the exponential growth in the unsecured lending market may have influenced the strategies and business models of commercial banks in South Africa, such as ABIL, as the banks were always looking to be competitive and earn profits from a variety of markets. Theobald (2013) expands on this by stating that the increase in competition in the market did not result in a decrease in price, but rather a decrease in the quality of the borrower as banks competed in a "race to the bottom" in credit vetting criteria. In other words, banks increasingly engaged in reckless lending (i.e. lending to households who could not afford the debt payments) in order to increase the return they received from those loans.

The vulnerability of ABIL was brought to light when economic conditions in South Africa began to decline; this became apparent when South Africa's growth rate slowed to just over two percent per annum annual growth (Economist, 2012a; Kumo *et al.,* 2014). McGregor (2014) argued that the growth rate slowed due to the pressure of increasing external debt and a rising current account deficit, accompanied by a decline in commodity prices, worsening the situation even further as South Africa relies on high commodity prices to sustain growth.

Another aspect of the South African economy that was a concern was the widening wealth gap between the rich and the poor. This is shown by the Gini coefficient which measures income distribution; a value of 0 is perfect equality, while a value of 1 is perfect inequality. The most recent data from StatsSA (2014) and the Economist (2012b) both report that South Africa's Gini coefficient is one of the worst in the world. The Economist (2012b) goes further to state that this inequality is partly due to the fact of a poor education system, which is based on substandard facilities and equipment and inadequately trained teachers. This poor level of education has resulted in South Africa's official unemployment rate holding at roughly 25%, while it is speculated that the actual level is closer to 40% (StatsSA, 2015, Economist 2012a; Economist 2012b). Sporadic labour unrest is not helping, as it affects both individual

companies' revenue and tax revenues (Economist, 2012b). The Economist (2012b) quotes Gill Marcus (previous governor of SARB), who stated that, the labour unrest and actions taken against the striking workforce (e.g. the Marikana massacre) had tarnished South Africa's reputation as a place to invest. Marcus stated that roughly R5.6 billion in equity market outflows were evidence of this loss in confidence. It was due to all these factors that Moody's decreased South Africa's sovereign debt rating in September 2012, referring to an inefficient government, growing social stresses and worsening conditions for investment as reason for the decrease (Economist, 2012a; Economist, 2012b).

Worsening economic conditions and high unemployment led to a decrease in household income and an increase in impaired records (Cameron, 2014) with ABIL, who held the largest share of the unsecured lending market being hardest hit. Dolan and Motsoeneng (2014) agree, arguing that household indebtedness is not only as a result of careless lending and borrowing but is also affected by economic factors that affect the repayment of the debt. Thus, the decline in income meant that borrowers could not pay off their existing loans and were forced to roll them over (using a new loan to retire an existing one). However, this became difficult as the supply of credit was decreasing and as SARB increased the regulation of the market due to concerns regarding the exponential growth of the market and the worsening economic conditions. Mutezo (2014) argues that a reduction in the repo rate at the time, although it should have, in principle at least, assisted with debt repayments; it also had the effect of decreasing the revenue banks earned from unsecured loans and, as a result the supply of unsecured loans decreased. Banks started withdrawing from the market due to a decrease in both potential profits and risk appetite that was brought about by increased regulation of the market and worsening economic conditions.

ABIL recorded a 26% drop in earnings for the first half of 2013 (Fin24, 2013) a situation that was aggravated by the fact (Dolan and Motsoeneng (2014)) that ABIL's business model did not allow them to take retail deposits as another source of income. At the end of 2013 and during 2014 there was a decrease in the amount of capital that ABIL could use to fund loans. Consequently, ABIL started recording heavy losses and had to start raising capital from external sources to try and stay afloat (England, 2014). Bonorchis (2014) argued that ABIL's looming bankruptcy started with an announcement that R8.5 billion would have to be raised to cope with a record financial year loss of R7.6 billion. This negative news caused a sharp drop in ABIL's share price, from R2.70 at the close of the previous day to 50c at the close of the next day (Bonorchis, 2014).

3.5 South African Household Indebtedness and a Possible Debt Crisis

Two years prior to ABIL's bankruptcy, economists warned that trouble was brewing in the South African unsecured lending market and that, if the problem of increasing household indebtedness, *inter alia*, were not attended to, then South Africa was heading towards a debt crisis similar to the one experienced in the U.S. in 2007/2008. This section discusses the current level of household debt in South Africa and how it could lead to a debt crisis in South Africa. Topics such as the low interest rate environment, the housing market boom, the growth in the unsecured lending market and the current account deficit are examined.

Colombo (2014) argued that many similarities existed between the bubble that caused the FC in 2008 and the situation that South Africa was in. A number of macroeconomic variables such as the low interest rate environment, growth in unsecured lending and subsequent increases in household indebtedness, a large financial sector, excessive public spending and a large current account deficit, if not managed correctly, could lead South Africa into a debt crisis. Duncan (2014) disagreed and, while acknowledging some important points raised by Colombo (2014), argued that a few of the elements in argument did not hold up to close scrutiny. South Africa's debt-GDP ratio, unsecured lending and the housing market were analysed and it was found that, while the current situation was not positive, it still lay within regulatory boundaries.

3.5.1 Low interest rate environment and housing market boom

Colombo's (2014) argument was that the low interest rate environment lay behind the creation and subsequent growth of credit bubbles. South Africa, it was maintained, had experienced two such environments in less than a decade; the first (the GM) led to exponential growth in the credit market in excess of the growth rate of the economy. It was argued that the low interest rate regime at the time was having the same effect, and that these periods of low interest rates had affected the housing market. For example, the housing price boom between 2000 and 2007 and the post-FC boom which saw housing prices increase by 10% between 2012 and 2013. The main concern was the reliance of the boom on the low interest rate environment, since it made the housing market vulnerable to changes in the interest rates. This was relevant to the situation in South Africa at the time, as the mortgage lending bubble experienced prior to the FC was also predicated on a low interest rate environment (Goodhart, 2008; Taylor, 2007). Duncan (2014) countered this by arguing that

political uncertainty had played a major role in the volatility of South African housing market, especially between the 1980's and early 2000's. While the period of Duncan (2014) is longer than other periods under review, the findings are still useful in understanding the counter-argument. Duncan (2014) maintained that the growth in the house prices was a correction of the market after the turmoil and not a boom predicated on a low interest rate environment. This was supported by the point that data released shortly thereafter showed that profits could be made by buying to rent, which Duncan (2014) argued, meant that the South African housing market was not in a bubble.

3.5.2 The growth in unsecured lending market

The main point of concern regarding South African households' indebtedness was the excessive growth in the unsecured lending market. Colombo (2014) likens an unsecured loan to the sub-prime loan used in America during the housing market boom before the FC. One similarity is that both sub-prime mortgage and unsecured loans were targeted at low- to middle-income, blue collar, workers. One of the main problems inherent to this is that the repayment is made difficult as a result of (many of) the borrowers using the loans for consumption rather than investment purposes. As a result, it became necessary for existing loans, plus accrued interest, to be rolled over with new (larger) loans. This would, as Colombo (2014) argued, result in an increasing amount of household debt; roughly twenty million South African citizens were carrying almost one and a half trillion rand in debt, equating to roughly 36% of GDP. Increasing household debt also meant that almost 80% of HDI is taken up by debt servicing, leaving households with just over 20c (per rand of disposable income) to cover living costs and other expenses. Duncan (2014) acknowledged the fact of rapid growth in the unsecured lending market, but resisted the idea that South Africa was heading towards a debt crisis. It was argued that unsecured lending formed only a small portion of total credit granted; this was confirmed by the NCA and data obtained from the NCR; in 2015Q2, unsecured lending made up less than 17% of total credit granted. Figure 3.7 overleaf shows the relationship between unsecured credit granted and total credit granted for the period 2007Q4 until 2015Q2.

Figure 3.7: Relationship between Unsecured Loans and Total Loans Granted, Quarterly Data from 2007Q4 until 2015Q2

Source: NCR (2015b)

Legend:
—— Unsecured Loans
—— Total Loans
▮ Proportion of Unsecured to Total Loans
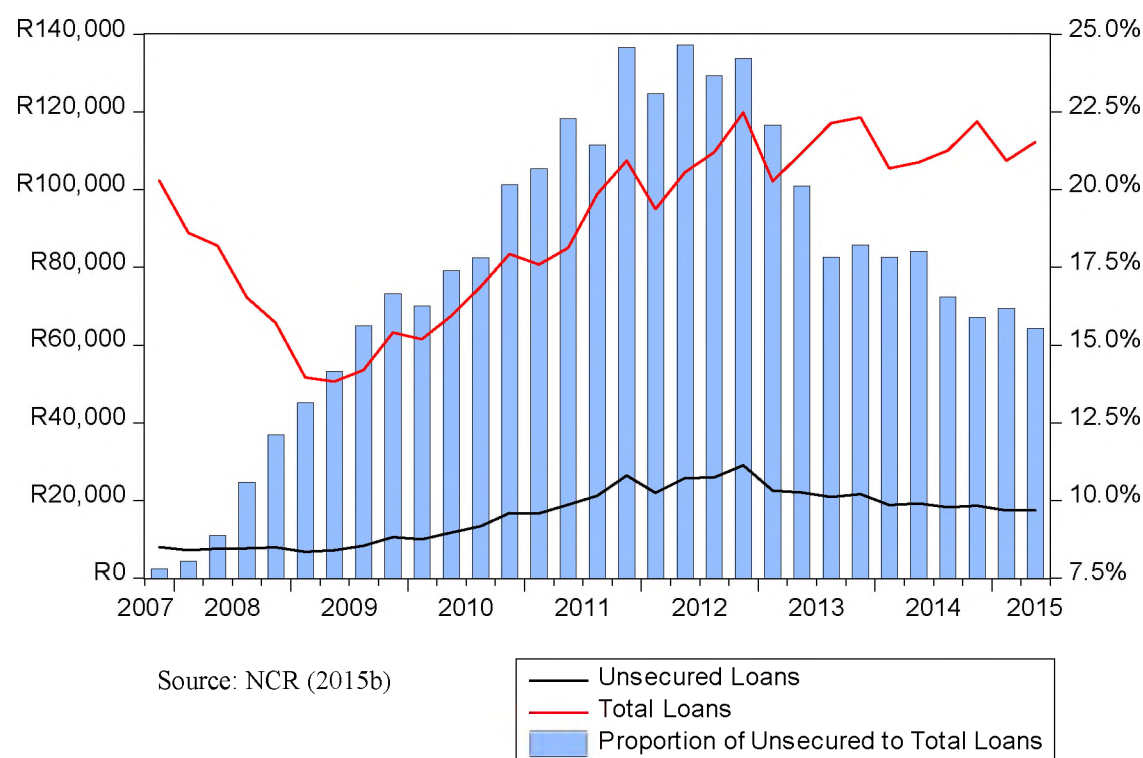
The figure above shows the rand value of unsecured and total loans in billions (left axis) and the percentage proportion of unsecured loans to total loans (right axis) for the period 2007Q4 to 2015Q2. It is evident that, after the financial crisis, the proportion of unsecured credit to total credit granted increased, reaching a peak in 2012Q2 of 24.67%. However, since then there has been a sharp reduction in the amount of unsecured credit granted and an associated decrease in the proportion of unsecured credit to total credit.

Duncan (2014) also observed that overall household debt had decreased from its peak in 2008, where the household DTI ratio was 81.9%; despite the worrying high level of debt, borrowers seemed to be paying it off.

Duncan's (2014) argument received some support from Loos (2015) and Loos and Swanepoel (2015) who found that the household sector is beginning to become less vulnerable to shocks to interest rates and income. Loos (2015) maintained that this can be observed through the decline in the household DTI and the debt service ratio (DSR). The DTI declined from 87.2% in 2008Q2 to 77.8% in 2015Q2, while the DSR improved from a high of 14.2% to 9.6% for the same period. Loos (2015) and Loos and Swanepoel (2015)

cautioned that, while both the DTI and DSR had improved, both were still far from the levels required to ensure the stability of the consumer credit health.

3.5.3 The financial sector

Another factor that concerned Colombo (2014) is the relative size of the financial sector, accounting for over 20% of GDP. This is unusually large; the United States' GDP has never had more than a 10% contribution from the financial and housing markets as well as business services. The South African stock market had also, since 2003, experienced exceptional growth; Colombo's (2014) concern was that, because the size of the overall financial sector and the share of the equity market, the economy is vulnerable to shocks emanating from the financial markets, as was experienced during and after the FC.

3.5.4 High government Debt-GDP ratio

Public sector spending helped boost the economy after the FC. Government bonds had low yields at the time, meaning a decrease in government's borrowing costs. This was taken advantage of as the government doubled both its borrowing and spending, and thus started to run a large budget deficit. The intention was to boost the economy after the FC, but at the cost of an increasingly large budget deficit. This was an issue of concern to Colombo (2014), in that it caused the government debt-to-GDP ratio to increase dramatically to approximately 40%. Duncan (2014) was not that concerned, saying that it needed to be put into context; South Africa's debt-to-GDP ratio is similar to other developing economies and is below the upper limit, for developing countries, advised by the International Monetary Fund (IMF). Duncan (2014) did, however, concede an issue of concern regarding the increase of foreign debt and that the proceeds were not being spent for investment purposes but rather on welfare payments. Despite these reservations, Duncan (2014) did not regard the picture to be as dire as that painted by Colombo (2014).

3.5.5 High current account deficit

The final issue of concern to Colombo (2014) is that, since 2003, South Africa has been running a current account deficit, the financing for which has come from foreign capital inflows. The main concern here is that it leaves South Africa exposed to changes in foreign

monetary policy and, as a consequence, the R/$ exchange rate. For example, the impact of the reports that the United States would be commencing with a tapering programme resulted in an immediate increase in SA bond yields and a depreciation of the exchange rate. The potential impact of changes in the Fed's discount rate remain a concern in the financial markets. Duncan (2014) did not deny the unhealthy outlook at the time, but contends that, in the absence further financial crises (the FC, for instance) and with the SA economy well-managed and regulated, the outlook is not as gloomy as depicted by Colombo (2014).

3.6 Conclusion

What is understood from the literature is that the credit health of a country's residents cannot be taken lightly. If debt is well regulated it can result in improved growth and welfare (Cecchetti *et al.*, 2011). However, if it is incorrectly managed and debt is allowed to increase to an unsustainable level, then problems like the FC and the bankruptcy of ABIL can occur. Reckless lending in a low interest rate environment results in higher rates of default can have which can affect the real economy.

This chapter examined the growth of credit extension in South Africa by considering the effects of the GM and the FC, the growth in unsecured lending and household debt in South Africa. The cause and effect of the GM and FC on South Africa was discussed to examine the effect that both periods had on credit extension in South Africa. The shift to and growth of the unsecured lending market was investigated as well as the concerns that were raised due to the exponential growth of the market, arguably leading to ABIL's bankruptcy. Finally, household debt in South Africa was considered.

Chapter 4 uses what is understood from the literature review and presents the data, methodology and techniques that will be used in the econometric analysis to investigate the effect of HDI and interest rates on household debt.

CHAPTER 4: DESCRIPTION OF DATA AND METHODOLOGY

4.1 Introduction

The literature consulted in previous chapters indicated that both the interest rate and the level of income are important macroeconomic variables affecting household debt. This chapter builds on that foundation to set out the empirical framework that is used in this study. The data to be used to investigate the relationship between the level of household debt and certain macroeconomic variables will be described, as will the procedures to be followed and methods employed. A positivist paradigm is used and the principal method implemented is a quantitative analysis. The structure of the chapter is as follows: Section 4.2 discusses the period of the study, the type of data used, where the data was obtained from as well as defines each data variable used in the study. Section 4.3 describes the Log-Log model that is used in the analysis. Section 4.4 discusses the tests for stationarity to be used in determining the order of integration of each of the variables used. Section 4.5 specifies the Vector Autoregression (VAR) model to be estimated to examine the relationship(s) amongst the variables. Section 4.6 describes the impulse response functions to be used to investigate the dynamic short-term relationships between the variables. Section 4.7 concludes.

4.2 The Model and Data

Quarterly time series data is used to analyse the relationship between the level of household debt, interest rates and household disposable income for the period from 1995Q1 until 2015Q3 (83 observations). Nominal values are used since, in the context of the investigation, nominal interest rates and income are regarded as being the variables of interest to lenders and borrowers. All the data was downloaded from research and statistics tab on the SARB website.

The debt service ratio (DSR) is used as a proxy for the level of household debt in South Africa and has been widely employed. Loos (2015) defines the DSR as the proportion of household disposable income that is needed to pay the interest on household debt, such as mortgages, bank overdrafts, personal loans and credit card balances. Mokoena (2008) offers an alternative to this 'conventional' method by including repayments of the principal; it was found that this adjustment raises the overall level of the DSR by almost 6 percent. This finding will be taken into account when the results are analysed in the next chapter. An

increase in the DSR will be as a result of either an increase in interest rates, a decrease in household disposable income or both.

The prime lending rate will be used as a proxy for all interest rates (i.e. the cost of credit). The repo rate itself is used as a basis for calculating interest payments on unsecured lending; the close link that exists between the prime lending rate and the repo rate means that there will be negligible difference in the statistical output. The prime lending rate is the benchmark rate at which banks lend to households and is reported by the SARB on a monthly, end of period, basis. NCR (2012a) states that most unsecured credit is granted at a fixed interest rate, which means that a change in interest rate will only affect new loans. An increase in interest rates will result in a deterioration of the DSR as a higher interest rate will lead to increased payments on new loans, which will feed through to existing loans as they are rolled over. In other words, due to the fixed interest rate nature of most loans the significance of the relationship might only become apparent when lagged time periods are allowed for. An increase in the interest rate will also have an effect on outstanding debt as capitalisation of unpaid interest and the average size of unpaid debts would increase accordingly.

Household disposable income (HDI) is the second independent variable. HDI is the income a household has after income tax payments have been deducted. An increase in HDI should result in a decrease in the DSR, as households will have more income with which to make their required debt payments. The relationship may, however, not be significant; households may "misuse" the increase in income by either increasing consumption or as a basis for claiming additional credit.

One computation was necessary to ensure the data was of equal frequency. The monthly data on the prime lending rate needed to be adjusted so that it fitted the quarterly data set. The SARB reports the prime lending rate data as 'end of period'. Thus, the monthly data that corresponds to the end of each of the quarterly periods (i.e. March, June, September and December) was extracted for each year to match the period under investigation.

4.3 The Log-Log Model

In a log-log model all variables are transformed by the natural logarithm (ln). Christ (1966) notes that the natural logarithm is more commonly used in econometric studies instead of the 'common' logarithm because it is more useful in theoretical problems involving growth. Mukherjee *et al.* (1998) point out that transforming the regression using natural logs helps

stabilise the variance, thereby making it easier to interpret the series. Hill *et al.* (2012) and Heij *et al.* (2004) provide another advantage to using log-log models; logarithmic transformations can normalise skewed data, making the data more symmetric around the mean. Using the model specified above to explain this:

$$LN(DSR_t) = \hat{\beta}_0 + \hat{\beta}_1 LN(HDI_t) + \hat{\beta}_2 LN(INT_t)$$

where LN denotes the natural logarithm, DSR_t = the debt service ratio, HDI_t = household disposable income, INT_t = interest rate charged on a loan, $\hat{\beta}_0$ is a constant, and $\hat{\beta}_1$ and $\hat{\beta}_2$ are coefficients that estimate the relationship between dependent and independent variables, given a unit-change to the latter.

An interpretation of the results would be, for example, that a one percentage point change in HDI_t will, ceteris paribus, result in a percentage point change in DSR_t equal to the value of $\hat{\beta}_1$. The variables used in this investigation have different units of measurement: the debt service ratio and the interest rate are given as percentages, while household disposable income is given as a rand value. As argued above, a log-log model simplifies the interpretation by making all the variables have the same unit of measurement.

4.4 Tests for Stationarity

The first step in any time-series analysis is to ensure that each individual time series is stationary. If not, then it is necessary to perform the appropriate transformation on the series (i.e. the first differencing of the variables) to avoid the possibility of a spurious regression. Stationarity tests are used to verify that the mean, variance and covariance of the series remain constant (i.e. independent of the point in time at which they are measured) and as a result ensure the model is estimated accurately (Gujarati and Porter, 2009). The formal stationarity tests to be used here are the Augmented Dickey-Fuller (ADF) unit root test, the Phillips-Perron (PP) unit root test and Kwiatowski-Phillips-Schmidt-Shin (KPSS) tests for stationarity.

The popular ADF test generally involves the estimation of the following regression equation (Enders, 2010):

$$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \sum_{i=1}^{n} \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

The ADF tests for the hypothesis that there is a unit root present (i.e. $\partial = 0$, non-stationarity) against the alternative hypothesis that the series is stationary ($\partial < 0$). Thus, we reject the null hypothesis (that the series is stationary) if $\partial \neq 0$.

The PP unit root test is similar to the ADF test in that it tests the null hypothesis that there is a unit root present and the interpretation of the results are the same (i.e. reject the null if $\pi = 0$). Mahadeva and Robinson (2004) argue that there is a difference: the PP unit root test is non-parametric (i.e. it not require the level of serial correlation to be selected). Zivot and Wang (2006) use the following for the PP unit root test:

$$\Delta \gamma_t = \beta' D_t + \pi \gamma_{t-1} + \mu_t$$

where μ_t is $I(0)$ and may be heteroskedastic. According to Zivot and Wang (2006) the PP test corrects for any serial correlation and heteroskedasticity through using a heteroskedasticity and autocorrelation consistent (HAC) covariance estimator by modifying the test statistics $t_{\pi=0}$ and $T\hat{\pi}$. Zivot and Wang (2006) illustrate the modified test statistics as follows:

$$Z_t = \left(\frac{\hat{\sigma}^2}{\hat{\lambda}^2}\right)^{\frac{1}{2}} \cdot t_{\pi=0} - \frac{1}{2}\left(\frac{\hat{\lambda}^2 - \hat{\sigma}^2}{\hat{\lambda}^2}\right) \cdot \left(\frac{T.SE(\hat{\pi})}{\hat{\sigma}^2}\right)$$

$$Z_\pi = T\hat{\pi} - \frac{1}{2}\frac{T^2.SE(\hat{\pi})}{\hat{\sigma}^2}\left(\hat{\lambda}^2 - \hat{\sigma}^2\right)$$

where the terms $\hat{\sigma}^2$ and $\hat{\lambda}^2$ are consistent estimates of the variance parameters.

$$\sigma^2 = \lim_{T \to \infty} T^{-1} \sum_{t=1}^{T} E[\mu_t^2]$$

$$\lambda^2 = \lim_{T \to \infty} \sum_{t=1}^{T} E[T^{-1}.S_t^2]$$

where $S_T = \sum_{t=1}^{T} u_t$ is the sample variance of the least squares residual, $\hat{\mu}_t$ is a consistent estimate of σ^2, and the Newey-West long-run variance estimate of μ_t using $\hat{\mu}_t$ is a consistent estimate of λ^2.

Mahadeva and Robinson (2004) argue that the main weakness with the PP test is that it is based on asymptotic theory; it works well with very large samples. The PP and ADF tests, according to Mahadeva and Robinson (2004), share similar disadvantages; both are sensitive to structural breaks and have weak small sample power, which leads the tests to the conclusion that a unit root is present when it may not be. To overcome these issues the KPSS

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test is also conducted.

The KPSS test differs from the ADF and PP tests in that the null hypothesis tested is that the time series is stationary against the alternative hypothesis that the series is non-stationary (Kwiatkowski *et al.*, 1992). The KPSS test statistic is:

$$KPSS = \frac{1}{T^2} \frac{\Sigma_{t=1}^{T} S_t^2}{\hat{\sigma}_\infty^2}$$

where T is the sample size, $\hat{\sigma}_\infty^2 = \frac{1}{T} var(S_t)$ is a HAC estimator and $S_t = \sum_{s=1}^{t} \hat{e}_s$ is a partial sum process (Kwiatkowski *et al.*, 1992).

According to Kohzan (2009), the KPSS test for stationarity is a one-sided right-tailed test and that the null hypothesis is rejected when the KPSS test statistic is greater than the corresponding asymptotic critical values.

4.5 Vector Autoregression (VAR) Model

A VAR model is defined as a multi-equation model which examines an endogenous variable (DSR) against its own lagged values as well as lagged values of other endogenous variables in the model (interest rate and HDI). Gujarati and Porter (2009) maintain that if a significant relationship exists between the lagged values of all the endogenous variables and the current value of the tested endogenous variable, then it can be concluded that past values of a particular variable will have an effect on the current level of the particular endogenous variable that is tested.

A VAR model will be used to examine the relationship between the debt DSR, the interest rate and HDI. Bernanke and Gertler (1995) argue that VAR modelling is useful in that it summarises the dynamic relationships between the variables in the model. It is able to do this as the model is able to analyse the responses of each variable to lags of itself and the other variables over time. Stock and Watson (2001) recommend using a VAR model as it is a powerful tool that describes the data and generates reliable multivariate forecasts. Furthermore, a VAR model has the capability to model co-movements between the variables that cannot be identified using normal univariate or bivariate models.

Bjørnland (2000) conducts an analysis of VAR models used in econometric research and finds an advantage of VAR models, over other macroeconomic models, in that the results are not complicated and easy to interpret. Sims (1986) maintains that VAR models offer a more

systematic approach to imposing restrictions, which allows for the analysis of empirical regularities that remain hidden in other macroeconomic procedures. Another advantage of VAR models is stated by Stock and Watson (2001); the impulse-response and variance decomposition functions that are inherent in VAR model estimations greatly assist in the analysis of the data and the relationships therein. For these reasons, a VAR model estimation will be used here.

Stock and Watson (2001) stress the importance of determining the appropriate number of lags when constructing a VAR model. To assist in this a number of selection criteria are used, including: log-likelihood (LogL); sequential modified test statistic (LR); final prediction error (FPE); Akaike information criterion (AIC); Schwarz information criterion (SC); and Hannan-Quinn information criterion (HQ). The VAR residual serial correlation LM diagnostic test will be used to investigate whether any autocorrelation was present in the residuals of the various VAR models. If it is found that autocorrelation is present in the VAR model, the lag length will be adjusted slightly in order to correct for the autocorrelation.

The general VAR model specification used to obtain the results presented in the next chapter is as follows:

$$D(LNDSR_t) = \propto + \sum_{i}^{t} D(LNDSR_{t-i}) + \sum_{i}^{t} D(LNHDI_{t-i}) + \sum_{i}^{t} D(LNINT_{t-i})$$

where D indicates the first difference of the variable, LN denotes logarithm, α is the constant, DSR_t = the debt service ratio, HDI_t = household disposable income, INT_t = interest rate charged on a loan, and i = number of lagged quarters.

4.6 Impulse Response Functions

In order to investigate the dynamic short-term relationships between the variables (i.e. the effect and persistence of a shock to the exogenous variables on current DSR) the impulse response functions can be used. Enders (2010) states that VAR models can be written as a vector moving average (VMA) models which can be used to trace the time path of the various shocks on the variables in the system. Brooks (2002) adds that if the estimated model is stable the effect of the shock should gradually fade. There are many ways of performing an impulse response analysis, but the Cholesky orthogonalisation approach is preferred, due to the fact that, unlike other approaches it incorporates a small sample degrees of freedom

adjustment when estimating the residual covariance matrix used to derive the Cholesky factor (Lütkepohl, 1991; Takaendesa, 2006).

Using a general two-variable model, for illustrative purposes, a VMA representation is:

$$\begin{bmatrix} y_t \\ x_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{x} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \phi_{11}(i) & \phi_{12}(i) \\ \phi_{21}(i) & \phi_{22}(i) \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{xt-i} \end{bmatrix}$$

This representation assists in the investigation of the interaction between and within sequences. The four components, $\phi_{jk}(0)$ are called impact multipliers and the four elements $\phi_{11}(i), \phi_{12}(i), \phi_{21}(i) \ and \ \phi_{22}(i)$ are terms. The impulse response functions and plotting the impulse response functions is a practical way to graphically present the behaviour of the $\{x_t\}$ and $\{y_t\}$ series in response to various shocks. These impulse response functions will trace out the response of DSR to shocks too the interest rate and HDI.

4.7 Conclusion

This chapter described the data and econometric methods to be used in investigating the relationship between the level of household debt, interest rates and household disposable income. Section 4.2 discussed the period of the study, the type of data used, and the source of the data. Section 4.3 defined each data variable used in the study. Section 4.4 explained the computational adjustments made in order to ensure all data types covered the same period at the same frequency. Section 4.5 described the Log-Log model that is used in the analysis. Section 4.6 discussed the tests for stationarity that were used to determine the order of integration of each of the variables used in the analysis. Section 4.7 specified the VAR model that was estimated to help examine the relationship between the variables. Section 4.8 described the impulse response functions that were used to investigate the dynamic short-term relationships between the variables. Chapter 5 presents the empirical results and analysis obtained using the data and methods discussed in this chapter.

CHAPTER 5: EMPIRICAL RESULTS AND ANALYSIS

5.1 Introduction

This chapter reports and analyses the empirical results obtained using the data, methods and procedures explained in the previous chapter. The structure of the rest of the chapter is as follows: Section 5.2 analyses the tests for stationarity that were conducted. Section 5.3 examines the empirical results obtained from the estimation of the VAR model as well as diagnostic tests that were run. Section 5.4 reviews the impulse response functions obtained from the VAR model. Section 5.5 concludes.

5.2 Tests for Stationarity

The first step taken in the analysis was to test if there was a unit root present in the variables. The datasets for each logged variable, the debt service ratio (LNDSR), household disposable income (LNHDI) and the interest rate (LNINT) were tested using the ADF, PP and the KPSS tests for stationarity. As discussed above, if the null hypothesis for the ADF and PP tests is rejected then it is concluded that the data series is stationary. The KPSS differs in that if the null hypothesis is rejected then the data series is concluded to be non-stationary. It was determined that for LNDSR and LNINT the test using only a constant and no trend gave the most robust results. This became evident when other forms of the tests were conducted, such as including a trend and having neither a trend nor a constant. In reviewing the results of all the different forms of the tests it was found that the more robust results came from the tests that included a trend in the analysis. These results for LNDSR and LNINT are presented in table 5.1, while the results for LNHDI are presented in table 5.2 overleaf.

Table 5.1: ADF, PP and KPSS first difference stationarity test results, with constant only

Variable	ADF	PP	KPSS
LNDSR	-5.207151***	-5.170920***	0.063458***
LNINT	-5.473672***	-5.357068***	0.052303***

Notes: ***, **, * Denotes 1%, 5%, and 10% levels of significance respectively
Automatic bandwidth (Newey-West Bandwidth) and lag length (SIC) selection
Source: Estimates from Eviews 9.

Table 5.2: ADF, PP and KPSS first difference stationarity test results, with constant and trend

Variable	ADF	PP	KPSS
LNHDI	-9.065033***	-9.664368***	0.066726***

Notes: ***, **, * Denotes 1%, 5%, and 10% levels of significance respectively
Automatic bandwidth (Newey-West Bandwidth) and lag length (SIC) selection
Source: Estimates from Eviews 9.

Chaiechi (2014) stresses that an essential feature any VAR model estimation is that all variables are integrated of the same order. It is evident from the test results above that all the variables are stationary in first difference terms, at a 1% level of significance. It is concluded that all variables are stationary in first difference terms (i.e. they are all I(1) and can be included in the VAR estimation).

5.3 Results of the Estimation of the Vector Autoregression (VAR) Model

Prior to the estimation of the VAR model a Johansen test for co-integration was done to ensure that the variables were not co-integrated; co-integrated variables affect the implementation and results of the VAR estimation. Beccarini (2013) notes that co-integrated variables could impact the results in two ways. Firstly, co-integration affects long-term forecasts, in that forecasting errors could be included in the results. Secondly, OLS regression results will show spurious relationships between the time series with deterministic or

stochastic trends. However, no co-integrating relationships were found, so an unrestricted VAR analysis was conducted using the first difference of the variables. Table 5.3 presents the estimation output for an unrestricted VAR model, with two lags.

Table 5.3: VAR model estimation results for D(LNDSR), with two lags

Variable	Coefficient estimates	Standard errors	t-statistic
D(LNDSR) -1	0.043774	0.13235	0.33075
D(LNDSR) -2	0.179448	0.08440	2.12626
D(LNHDI) - 1	-0.168883	0.28396	-0.59475
D(LNHDI) - 2	0.794668	0.28033	2.83476
D(LNINT) - 1	0.868591	0.09016	9.63346
D(LNINT) - 2	-0.309462	0.01052	-2.35776

Model Specification	
Adj R-squared	0.702697
F-statistic	32.12042
AIC	-3.839886
SIC	-3.631459

Source: Estimates from Eviews 9.

The results indicate that at the first lag HDI has negative relationship with current DSR, but this relationship is not statistically significant (this is indicated by the t-statistic being less than 2), while a statistically significant positive relationship between HDI and DSR is found at the second lag. The results suggest that a one percentage point increase in HDI will, *ceteris paribus*, result in a 0.79 percentage point increase in the DSR after two periods.

The estimation results of INT differ from those of HDI in that both lagged periods are statistically significant, with the first lag having a positive relationship that is highly statistically significant. The second lag, while still being significant, is less so than the first period, suggesting that the longer the time lapse between current DSR and lagged INT the less significant a change will be. The results for the first lag indicate that, *ceteris paribus*, a one percentage point increase in INT will result in a 0.87 percentage point increase in DSR.

The VAR model specification and information criteria indicate that the data fits well to the estimation model and that the model as a whole is statistically significant.

A lag extension diagnostic test was performed to investigate whether the estimation included the right number of lags. The results of the lag length test are reported in table 5.4. The selection criteria, explained in the previous chapter, indicate that a VAR model with one lag is more appropriate.

Table 5.4: VAR model lag length criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	467.1184	NA	1.17E-09	-12.05502	-11.96371	-12.01850
1	515.9196	92.53207*	4.15e-10*	-13.0882*	-12.72355*	-12.94272*
2	522.2657	11.5385	4.45e-10	-13.01989	-12.38067	-12.76421
3	525.8443	6.227579	5.14e-10	-12.87907	-11.96590	-12.51381
4	532.9745	11.85280	5.43e-10	-12.83051	-11.64338	-12.35567
5	537.0356	6.434594	6.22e-10	-12.70222	-11.24115	-12.11781

Note: * indicates lag length chosen by criterion

Source: Estimates from Eviews 9.

The results of a VAR estimation with one lag using DSR as the dependent variable are reported in table 5.5 overleaf.

Table 5.5: VAR model estimation results for D(LNDSR), with one lag

| Variable	Coefficient estimates	Standard errors	t-statistic
D(LNDSR) -1	-0.068717	0.08779	-0.78274
D(LNHDI) - 1	-0.089433	0.29269	-0.30556
D(LNINT) - 1	0.866971	0.09217	9.40571
Model Specification			
Adj R-squared	0.671416		
F-statistic	55.48953		
AIC	-3.786373		
SIC	-3.668132		

Source: Estimates from Eviews 9.

The relationships and significance, with regards to the first lag of each variable to DSR, are similar to the results reported in table 5.3. Where the results differ is in the model specification. The new model has a lower adjusted R-squared and a higher (worse) AIC. However the overall model is more statistically significant and the SIC is lower (better). Thus, the model specification criteria are mixed. However, when an LM test for autocorrelation is run against each of the models it indicates possible autocorrelation at the 2nd and 3rd lag. As a result, the latter model is chosen to be the best representation of the relationship between the variables.

## 5.4 Analysis of the Impulse Response Functions

The impulse response functions of the VAR model were investigated to further examine the relationship between the DSR, HDI and interest rates. As this study is focused on the effect of a shock to the independent variables on the DSR, only the impulse response functions relating to the DSR are presented below. Figure 5.1 overleaf depicts the three impulse response functions of DSR to a shock to HDI and interest rates.

Figure 5.1: Impulse response functions, with ten periods (Quarters)

Panel (a): Response of D(LNDSR) to D(LNHDI)
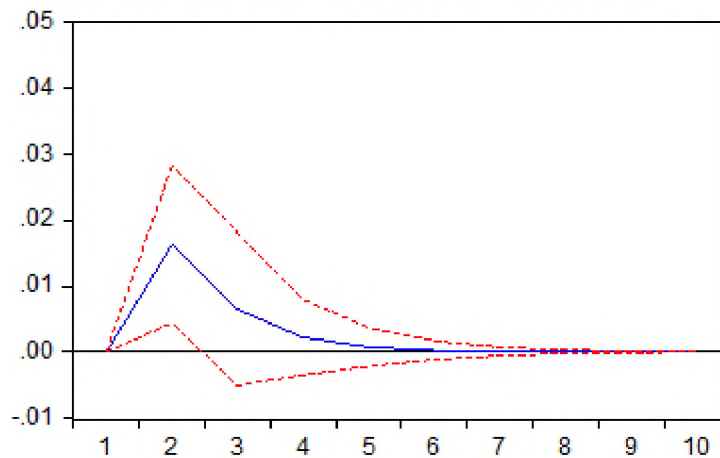
Panel (b): Response of D(LNDSR) to D(LNINT)
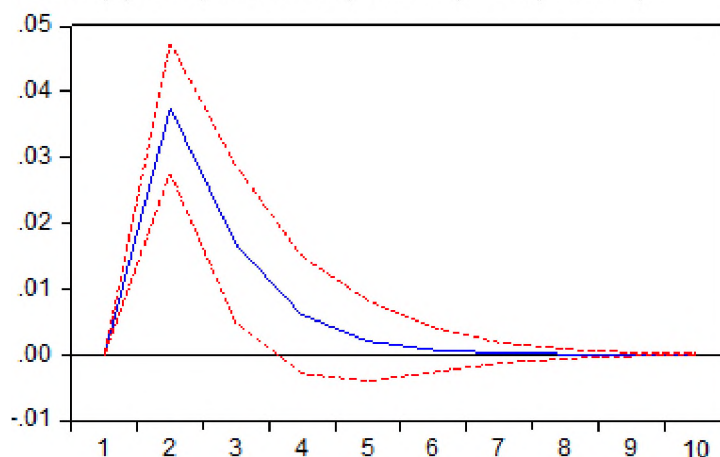
As can be seen in panel (a) and (b), a shock to either HDI or INT has an immediate impact on current DSR for one quarter. In the second quarter the shock starts to decline exponentially until it reaches equilibrium in sixth quarter. For HDI, this suggests that a shock to HDI will immediately affect current DSR and that this effect will persist for a number of quarters. This is logical, as an increase in HDI will improve a households' DSR as households will have more income with which to pay-off debt. In terms of INT, the effect on DSR is due to the fact that interest rates are the cost of financing debt, and that interest rates are one of the components that make-up the DSR calculation. For both HDI and INT the effect of the shock decreases over time as households adjust to the new level.

5.5 Conclusion

This chapter presented and analysed the empirical results obtained using the data, methods and procedures explained in the previous chapter. Section 5.2 considered the tests for stationarity that were conducted. Section 5.3 examined the empirical results obtained from the VAR model. Section 5.4 reviewed the impulse response functions obtained from the VAR model.

A number of key findings were made: (i) that HDI is not a significant determinant of household debt while the interest rate is, (ii) initially an increase in HDI is used to assist in debt payments, but as consumers become accustomed to the new level of consumption there is an increase in debt as consumers wish to remain at that level, and (iii) an increase in interest rates will increase the level of household debt, but over time consumers will adjust to the higher cost of finance. These findings partly corroborate the hypotheses stated in Chapter 1 and Chapter 4. Firstly, it was shown that a change in interest rates will have a significant impact on household debt, but it was found that household disposable income would not. Secondly, it was shown that there is a positive relationship between interest rates and the level of household debt, while there a negative relationship between household disposable income and household debt.

Chapter 6 will conclude the study by providing a summary of the main topics covered as well as highlighting possible areas of further study.

CHAPTER 6: SUMMARY, CONCLUSIONS AND AREAS FOR FURTHER RESEARCH

6.1 Introduction

This chapter provides a summary of the study, reiterates the hypotheses and goals, considers forward the empirical findings, and suggests areas for further research. This chapter is structured as follows: Section 6.2 provides a summary of the study. Section 6.3 presents the hypothesis and goals of this study. Section 6.4 will state the empirical findings of this study and how they relate to the hypotheses theorised. Section 6.5 discusses possible areas for further study.

6.2 Summary of the Study

The behaviour of credit extension in South Africa was analysed by discussing the relevant aspects of credit extension with reference to contemporary literature. Using what was found in the literature review as a foundation for an empirical analysis, the relationship between household debt, household disposable income and nominal interest rates in South Africa was investigated. Furthermore, the dynamic short-term adjustment of household debt in South Africa following shocks to household debt, household disposable income and nominal interest rates in South Africa was examined.

The literature regarding the two periods of growth in the credit market was reviewed and it was found that, along with other factors, the interest rate charged and household income had a significant impact on the level of household indebtedness. Another finding was that both the FC of 2007/2008 and the bankruptcy of ABIL were founded on reckless lending conducted by the financial institutions. Furthermore it was found that this conduct by the banks was supported by a financial deregulatory and liberal environment maintained by the central banks and relevant legislatures. What is apparent from the literature is the importance of household debt to the economic performance of a country. It is evident that the growth of household debt allows households to increase their consumption expenditure and standard of living. The increased consumption spending should have a knock-on effect on investment and savings at the national level. All of these factors contribute to an increase in a country's GDP and thus the advancement of that country's economy. However, it is clear from the literature reviewed that if household debt is not controlled it could lead to a situation where

households find themselves in a debt trap (taking out debt to pay off debt) and this situation could result in the bankruptcy of individual banks or, at the worst, a collapse of the financial system that would feed through to the real economy.

Time series analysis was employed to explore the relationships between household debt, interest rates and HDI. The debt service ratio was used as a proxy for the level of household debt, while the nominal prime rate was used to represent interest rates and HDI to denote the income level of households. A log-log model was used as it normalised the variables which simplified the interpretation of the results by changing the data into proportional/percentage changes. Formal tests for stationarity were conducted and it was found that all the variables were integrated of the first order and no co-integration was found. A VAR model was estimated to determine the relationship and significance of lagged exogenous variables to current DSR. It was found that HDI was not a significant determinant of DSR, but that interest rates were. Diagnostic tests were conducted to ensure the reliability and validity of the estimated model. Autocorrelation was found to be present and the model was adjusted accordingly. Finally, the impulse response functions of DSR were analysed to determine the effect of shock(s) to the exogenous variables on current DSR. It was found that shocks to all variables did have an initial affect to DSR which then returned to equilibrium after roughly six quarters.

6.3 Hypotheses and Goals of the Study

The main hypothesis put forward by this study was that a change to either interest rates and/or disposable income would have a significant impact on the level of household debt in South Africa. There were other hypotheses stated in Chapter 4. The outcome of these hypotheses will be discussed in the next section.

The main goal of this study was to analyse relevant aspects of credit extension in South Africa. Two supplementary goals were stated, these were to:

1. Analyse the proportionality of secured and unsecured credit extension to total credit in South Africa.
2. Establish the sensitivity of the level of household debt to interest rates and income levels.

6.4 Empirical Findings

The initial empirical results from the VAR estimation indicated that both the first and second lags of INT and the second lag of HDI were statistically significant in relation to the current level of household debt. What is interesting to note is that the nature of the relationship changed between the first and second lag for HDI and INT. Regarding HDI this indicates that initially households will use the increase in income to help pay-off debt, but thereafter use the increased income for either consumption or to acquire more credit. In terms of INT this suggests that an increase in interest rates will initially increase the level of household debt, but in the next quarter would result in a decrease in household debt as households would reduce their level of debt as the cost of financing the debt has increased. Diagnostic tests were run and it was found that the estimated VAR model should be run to include only one lag. The results obtained corroborated the hypothesis set out in Chapter 3. However, it did not fully corroborate the main hypothesis as these findings did not indicate a significant relationship between household debt and household disposable income.

6.5 Areas for Further Research

This study sought to extend the literature on credit extension in South Africa by focusing on the secured and unsecured markets for the last two decades. This period was chosen because it contained both a growth in the secured and unsecured markets with a notable 'end' to both periods. Going forward, the period could be extended to include the entire span of the Great Moderation. Cross country analyses could also be conducted to investigate the similarities between credit extension in South Africa and other developing countries. Another area for further study is to include other factors that affect the level of household debt. These include the unemployment level, the structure of the loan and regulatory requirements placed on financial institutions. As noted earlier it has been proposed to the Department of Trade and Industry to decrease the interest cap on all loans; this will have significant effect on the level of household debt as it would reduce the cost of credit. Finally, the debt service ratio was used as a proxy for the level of household debt as an actual measure for the variable could not be obtained. The level of impaired records published by the NCR and the aggregated bank reports presented by the SARB were considered. However, the actual level of household debt would help shed considerable light on what effects the level of household debt and how this would relate to credit extension in South Africa.

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