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Creating Opportunities

Monetary Policy Shocks and Household Indebtedness in South Africa

ANNITER AMANDA MASINA

(219024405**)**

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Supervisor: Professor Andrew Maredza

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iii.   ACKNOWLEDGEMENTS AND DECLARATIONS

I write this acknowledgement with utmost gratitude and humility. As I reflect on the completion of my academic journey and the creation of this thesis. I am compelled to express my profound appreciation for God's divine guidance. Your unwavering presence has been my beacon, transcending the realms of human understanding. I acknowledge Your wisdom and blessing that shaped every word and thought within this work.

It is of good pleasure that I learnt to believe in myself while conducting this study. I am profoundly grateful to my supervisor Prof Andrew Maredza, for his guidance, support, patience and constructive feedback, throughout the study. His vast expertise has enriched this project substantially.

"Philippians 4:7 - And the peace of God, which transcends all understanding, will guard your hearts and your minds in Christ Jesus."

iv.   ABSTRACT

This study aim was to examine how monetary policy shocks affected household indebtedness in South Africa from 1990 to 2021 using annual time series data from the South African Reserve Bank and FRED. To fulfil the research objectives, the auto-regressive distributed lag (ARDL) model was utilized. The model implies a negative correlation between interest rates (-0.1137) and household indebtedness across the duration of the study. The findings indicate that any change in interest rate has a negative (-0.1137) impact on household debt, and inflation negatively (-0.8277) and significantly affects household indebtedness, suggesting that any variation in inflation adversely impacts the level of household debt. F-bound test (5.3691) illustrates a sustained relationship between the dependent and independent variables. With the goal of protecting the value of the rand, the South African Reserve Bank utilizes interest rates as a tool to combat inflation. while the results in this study indicated that there is no correlation between interest rate and inflation. Based on the results it is concluded that the monetary policy is not effective and needs to be revised. Therefore, it is essential to design monetary policy in a manner that supports households, especially those belonging to the middle class and lower income brackets.

Key words: Household indebtedness, interest rate, inflation, monetary policy, South Africa.

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CHAPTER 1: INTRODUCTION OF THE STUDY

1.1. Background of the study

South Africa is facing a notable problem with the household debt to disposable income ratio, which suggests a concerning level of over-indebtedness. This situation not only affects the well-being of households, but also has a negative impact on overall economic growth. A study conducted by Karambakuwa and Ncwadi (2021) revealed that households encounter significant difficulties in effectively managing their finances, safeguarding themselves against exploitative lending practices, and obtaining crucial credit-related information. Increased interest rates may lead to a decrease in income growth and a reduction in debtor cash flows, potentially impacting the ability to repay debts. This, in turn, could have an adverse effect on debt-to-income ratios. (Fagereng, et al., 2021). One issue that can endanger the stability of the financial system and the economy is household debt. The second issue is the distributional effects of excessive household debt in the context of lending restrictions (Emiris & Koulischer, 2021)**.** Yuvejwattana (2023) points out that the rise in household debt has substantial impacts on the overall economy, regardless of whether it is increasing in a sustainable manner. The household sector is likely to be highly responsive to fluctuations in interest rates, particularly if they are unexpected, as well as changes in income, particularly those resulting from unemployment. The level of sensitivity is crucially influenced by the ratio of fixed-rate to variable-rate mortgages held by households. In countries where variable-rate mortgages are more common, the sensitivity tends to be higher.

Emiris and Koulischer (2021) observed that borrowers are typically required to put down a certain amount of money when purchasing a home. The borrower's two attributes in this instance determine the amount borrowed. The household's projected future income is the first. Households will prefer to allocate more resources to the current period if they anticipate future income to be significant. The household's wealth, which can be utilized as a down payment for the mortgage, is the second deciding factor. Both of these factors will change if interest rates fall. In the beginning, it will lower debt costs and normally raise the current value of future revenue. Second, reduced rates will raise the value of the wealth that has been accumulated and invested in things like bonds or real estate. The second route improves the resources of wealthier, older households who have already amassed money, while the first channel prioritizes poorer, younger households, their primary resources are their future income.

To create and preserve price stability, advance sustainable and balanced economic development, South Africa's monetary policy transmit to the economy through different channels (SARB, 2023). According to Greenwood-Nimmo (2022) the repo rate, also known as the interest rate at which South African commercial banks and the South African Reserve Bank (SARB) would engage in overnight repurchase agreements, serves as the primary tool for implementing monetary policy in South Africa. The repo rate is the standard price for borrowing in the banking sector. To fulfill its constitutionally mandated mission of attaining and preserving price stability for the sake of sustainable and balanced economic growth, SARB determines the repo rate. The range of interest rates commercial banks offer is largely influenced by changes in the repo rate, which is a major way in which they impacting the whole economy. Fluctuations in bank interest rates exert an influence on how much it costs people to borrow money from external sources and how much it costs them to hold liquid assets. The variance compared to the repo rate is favorable and significantly widening for home loans, this spreading has been progressively ongoing. but for business loans, it has stabilised. The historically low repo rate may result in elevated mortgage rates on new loans compared to the situation preceding the global financial crisis, Considering the growing disparity between households, mortgage rates and the repo rate, which is of worry to policymakers (Greenwood-Nimmo, et al., 2022). The huge spike in family debt has added to China's resident's concerns about economic stability. China is attempting to stabilize its economy by increasing its consumer spending (Canakci, 2021).

Inflation refers to the persistent increase in the prices of goods and services across a market. It could be regarded as a consistent increase in prices, expressed either by the implicit price deflator for Gross National Product or the consumer price index (CPI). Liman (2021) stated that price stability is absolutely necessary for the growth of the financial industry because severe rates of inflation inhibit long-term contraction, aggravate informational asymmetry, and increase ethical risk. The Covid19 pandemic had a significant impact on the economies of many countries. Indonesia's inflation in July 2020 was reported to have weakened and reached -0.01% by the Central Bureau of Statistics. The abrupt shift in inflation can be attributed to the increase in layoffs and the shift to remote work for many individuals. A research study performed by Yuniarti (2021) discovered that the main factor driving inflation in Indonesia was the rise in gold prices. This was due to individuals who were less impacted by economic fluctuations choosing to invest in assets that are considered more resistant to inflation and depreciation of currencies. The sector in China that provides minimal wages to its employees

is the most significantly impacted by the Covid-19 pandemic. Given that the past shutdowns have impacted debtors with lower income credit, this increases the probability of consumer credit defaults. Consequently, the macroeconomic impact of household debt distribution on low-income debtors can result in increased risk, despite the apparent manageability of the aggregate household debt burden. This potential reduction in household income is particularly unfavourable to short-term credit card debt (Canakci, 2021). The effects on consumer credit market by the COVID-19 epidemic was analysed and evaluated by (Czech and Puszer, 2021). The findings of the investigation indicated that the Covid-19 pandemic has significantly influenced the level of household debt and has not been indifferent to the decisions of households to obtain consumer loans, which it is the case for South Africa to be addressed in this study. Mamatzakis (2022) examined how people with home debt reacted to the effects of Covid-19 on monetary policy. The findings indicated that household debt shows a positive correlation with the effects of Covid-19.

1.2. Problem statement

The problem identified by this study is that South African households are indebted due to the shifts in monetary policy. People do not understand monetary policy shocks or inflation and interest rate fluctuations due to lack of financial illiteracy. The study aims to clarify government monetary policy, household indebtedness, and debt repayment. Tighter monetary policy discourages borrowing, although some families may borrow more to refinance growing debt due to rising debt servicing costs (Fagereng et al., 2021). South Africa's rising inflation and interest rate hikes reflect the latter. A graphic study of South African Reserve Bank data shows a decrease in household debt to income since 2020. South African household debt-to-income ratio was 64.3% in 2021. High and rapidly increasing household debt levels can be a cause for concern. Households with a substantial amount of debt may be more vulnerable to unforeseen shifts in income or financial stability. Furthermore, when confronted with financial pressure, households that have accumulated significant debt are more likely to reduce their spending compared to those with less debt. This has the potential to contribute to a recession and provides insight into the factors behind the underwhelming recoveries seen in many advanced economies. Financial institutions may experience direct losses as a result of extending credit to households., as in most cases households are not able to pay the debts (Hunt, 2015). Financial institutions' stability and, thus, their capacity to support the economy are impacted by losses or decreased profitability. High levels of debt that lead to non-performing loans or losses have an impact on financial institutions capacity to provide further credit to other economic sectors,

which slows growth and lowers government taxes. The South African Reserve Bank (SARB) has increased the repo rate in an effort to combat anticipated inflationary concerns. Raising the repo rate results in higher borrowing costs for banks, which is expected to reduce their lending activities. A decrease in bank lending leads to a contraction in the money supply, which typically results in a decline in inflation; however, this relationship cannot be considered true for South Africa (SARB, 2023).

1.3. Research questions

The study aims to address the subsequent three research inquiries:

- What is the nature of the association between monetary policy variables and indicators of household debt in South Africa.
- How do shocks in inflation and interest rate impact household debt in South Africa.
- What other factors affect household indebtedness in South Africa, and what is their impact.

1.4. Aim of the study

The aim of the study is to address household indebtedness in South Africa, and ascertain how monetary policy impacts household indebtedness.

1.4.1 Objectives of the study

The primary objective of the study is to investigate the impact of monetary policy shocks on household indebtedness in South Africa over the period of 1990 to 2022.

1.4.2 Sub-objectives of the study

The sub-objectives are as follows:

- To provide an overview of monetary policy variables and household debt indicator trends over the study period.
- To estimate the impact of inflation and interest rate shocks on household debt indicators.
- To identify and estimate the impact of other key drivers of household indebtedness in South Africa.

1.5. Hypotheses of the study

The study tests the following sets of hypotheses:

H₀: Changes in monetary policy variables do not significantly influence the household debt in South Africa.

H₁: Changes in monetary policy variables significantly influence the household debt in South Africa.

H₀: Interest rate shocks and inflation have no significant impact on the household debt in South Africa.

H₁: Interest rate shocks and inflation significantly impact the household debt in South Africa.

H₀: Other key driving factors have no significant impact on household debt in South Africa.

H₁: Other key driving factors have significant impact on household debt in South Africa.

1.6. Significance of the study

This study seeks to fill a void in the existing literature by analysing household indebtedness in South Africa during a period of high inflation and interest rates. The findings of the study provide significant implications for decision-makers in the policy arena, individual households and other stakeholder regarding the dynamics of the relationship between monetary policy and household indebtedness. The recommendations presented in this study strive to prevent further expansion of household debt. It is critical to understand the South African Reserve Bank reasons and the implementation of the implications of monetary policy on the South African economy. It is essential to understand the impacts of the rising interest rate and high inflation on household. Since 2010, the South African interest rate increased 7.0% in 2019, reducing household debt to 62.2 percent in 2022. Inflation fluctuated and began to fall in 2020 while the interest rate was low and household indebtedness high. The SARB has raised the repo rate to contain inflation in the post-Covid-19 economy. The repo rate went up from 4% in January 2022 to 8.25% in May 2024, which is a concerning increase in just two years. It is crucial that the financial sector consumer protection standards exceed the broad rules to protect consumers established by laws such as the Consumer Protection Act and the National Credit Act (National-Treasury, 2013).

Household debt provides advantages to families by allowing the acquisition of products and services that would otherwise be unaffordable in a single payment, thereby enhancing their quality of life. They therefore maintain their consumption over a period of time, contributing to economic stability. When households default on loans from commercial banks and alternative lending institutions, it jeopardizes the overall economy, as these funds are derived

from savings, leading to banks' inability to meet their obligations to depositors (Zimunya & Raboloko, 2015). In the financial sector, an increase in household debt leads to a rise in non-performing loans, undermines the financial statements of intermediary institutions, and diminishes the access to credit, ultimately resulting in a decline in household consumption. In South Africa, there has been a persistent rise in household debt alongside a high debt-to-income ratio and an increase in repayment defaults, presenting challenges to the credit sector and economic stability. Increased debt levels increase the probability of defaulting on loans and contribute to irregular financial cycles, thereby posing a risk to the stability of the financial system (Karambakuwa & Ncwadi, 2021). High household debt in South Africa is due to both demand and supply side factors. The factors consist of increased financial inclusion post-independence, insufficient financial education, and unresolved debt contracts alongside reckless lending practices by financial intermediaries. A greater proportion of disposable income allocated to debt repayment results in reduced savings, leaving households more vulnerable and financially disadvantaged. This results in a decrease in available funds for investment in the economy, thereby diminishing domestic capital formation. Reduced domestic investment leads to slow economic growth, accompanied by rising poverty and unemployment rates. South Africa's GDP growth has declined recently, attributed to decreased domestic savings among other factors.

Indebtedness has the potential to accelerate economic crises and disrupt spending patterns across various stages of the business cycle (Kukk, 2015). It is clear that the South African economy has been negatively affected by the Covid-19 pandemic, leading to a decline in growth. From an economic perspective, the high level of unsecured lending in South Africa presents substantial socio-economic risks that affect the entire country. Karambakuwa and Ncwadi (2021) suggested that the accumulation of debts in excess can result in a decrease in the social and economic well-being of households. Clear indications of significant concern necessitate government intervention in the credit sector. This research enhances the existing knowledge regarding household debts and monetary policy disruptions. It is surprising that there has been a lack of comprehensive research on this subject in the South African context, resulting in a significant gap in the literature.

1.7 Structure of the study

Chapter1 briefly gives the introduction of the study which entails the background, problem statement research questions, aims and objectives, hypotheses and the significance of the study. Chapter2 is an inclusive overview of monetary policy implementation, explains the trends in

household debt in South Africa. It includes statistics and graphs of the inflation and the interest rate for the year spanning 1990 to 2021, interest rate and inflation changes versus household debt behavior, the regulation of debt in South Africa, such as the National Credit Act, credit bureaus, secured vs unsecured lending, debt protection in RSA. Chapter 3 covers the theoretical framework and empirical literature of this research. Chapter 4 discusses the study's methodology, variables, and expected dependent-independent relationships. The World Bank and Federal Reserve Bank of St. Louis provide the 32-year period's dependent and explanatory variable data. The diagnostic procedures are performed to reveal the connections among the explanatory variables. Chapter 5 presents the estimation of the model, the results are comprehensively reported and discussed in detail. It includes the descriptive statistics of the data under examination, followed by the implementation of unit root testing and various diagnostic tests. Estimate the ARDL model in conjunction with the bounds test of cointegration and then interpret the results. Chapter 6 serves as the conclusion and includes the key findings and policy recommendations.

1.8. Summary

The study begins with a background that outlines the context, followed by an in-depth analysis of the problem statements stating how monetary policy contributes to household indebtedness, research questions, aims and objectives stating the purpose of conducting the study, hypotheses, the significance of the study and the structure of the study.

CHAPTER 2: OVERVIEW OF HOUSEHOLD DEBT TRENDS IN SOUTH AFRICA

2.1. Introduction

An overview of monetary policy shocks on household indebtedness, amid high inflation and increasing interest rate are discussed in this chapter.

2.2. An overview of Monetary policy implementation

Maintaining inflation within the prescribed goal range of 3% to 6% is South Africa's major goal with regard to monetary policy. In practical application, when the rate of inflation above the predetermined 6% threshold, the South African Reserve Bank (SARB) will proceed to elevate the official interest rate, also known as the repo rate, with the intention of rectifying inflation levels and aligning them with the desired target range. According to the Taylor principle, in order to achieve inflation stabilization, it is recommended for a central bank to adjust its interest rate instrument by a magnitude greater than the corresponding increase in inflation, surpassing a one-to-one relationship. It is now widely acknowledged that the success of a monetary policy in stabilizing inflation and achieving inflation objectives is dependent to a significant degree on the persistence of market interest rates. For monetary policy to be effective, it is necessary that a change in the official Interest rate be rapidly communicated to other interest rates and that the magnitude of the adjustment be sufficient to influence aggregate demand in some manner (Meshach & Magdalene , 2013).

2.2.1. Household debt trends

The escalation of household debt has emerged as a significant global issue, with rising indebtedness exacerbating financial instability and economic deceleration (Jamaluddin, et al., 2025). South Africa's household debt went up to 62.40 percent of gross income in 2023, up from 62 percent in 2022 (SARB, 2023). According to *Figure 2.1,* in 2001 household debt shows an upward trend which led to the Global Financial Crisis, household continued to borrow more. The trend show a decrease after 2009 which is when household were recovering from the GFC. A stable economy is characterized by low household debt levels. To maintain low household debt levels, banking institutions, as the principal credit providers in various nations, including South Africa, must exercise severe and sensible criteria in loan issuance to clients. The household sector, burdened by increasing debt, may be vulnerable to many negative circumstances such as unemployment shocks, asset price fluctuations, and income disruptions (Meniago, et al., 2013). Debts allow households to spend and invest during low income periods. Since individuals and households want to smooth their consumption pathways and invest early,

borrowings allow them to make intertemporal decisions. Increased borrowings may mitigate transitory income shocks like unemployment. Smoothing consumption across time maximizes household utility. Low income relative to average income leads households to borrow for current spending. Loans seem like a logical response to temporary income changes (Stefan, 2023). With a lot of income inequality, wages are a better way to tell if someone is creditworthy. On the other hand, this means that income inequality is more likely to be linked to families with lower (higher) debt levels. However, others say that the rise in household debt before the crisis was linked to the rise in income inequality, which in turn caused problems in the overall economy. People who thought they were falling behind were encouraged to take out loans so they could start spending more and catch up with people who made more money. Due to this, income imbalance may lead to household debt that can't be paid off (Meniago, et al., 2013).
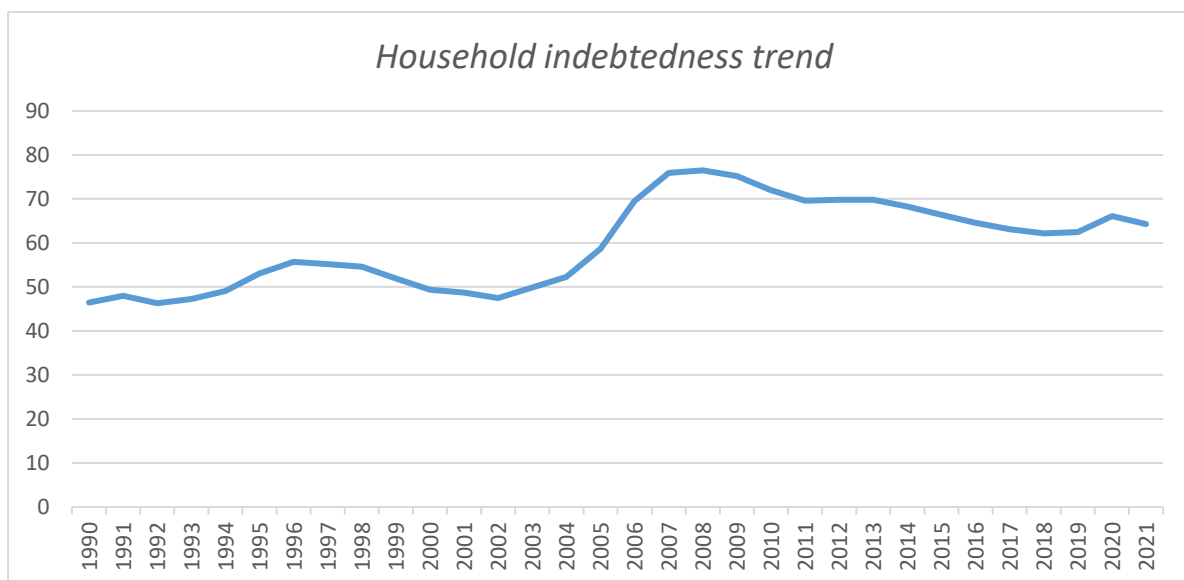
Figure 2.1 Household trend

2.2.2. Inflation trends

Inflation includes more complexities than price fluctuations, such as increasing fuel expenses. Annually, prices generally exceed those of the previous year in most economies. According to *Figure 2.1.* between 2010 and 2020, consumer prices in South Africa, the increase was 65%, indicating an average annual inflation rate of 5.2%. During the same period, inflation rates fluctuated in various countries. In this regard, while inflation in Turkey approached 10%, it averaged 1.8% in the United States. This illustrates the reflection of the country's economic structures and policy choices in inflation trends. Statistics South Africa (Stats SA) provides the

consumer price index as the recognized measure of inflation in the country. This index reflects the consumption patterns of goods and services of households in South Africa (SARB, 2023). According to Son & Park (2019) in a small open economy, macroeconomic and financial variables, including interest rates and prices, can significantly fluctuate in response to external shocks, such as shifts in global interest rates.
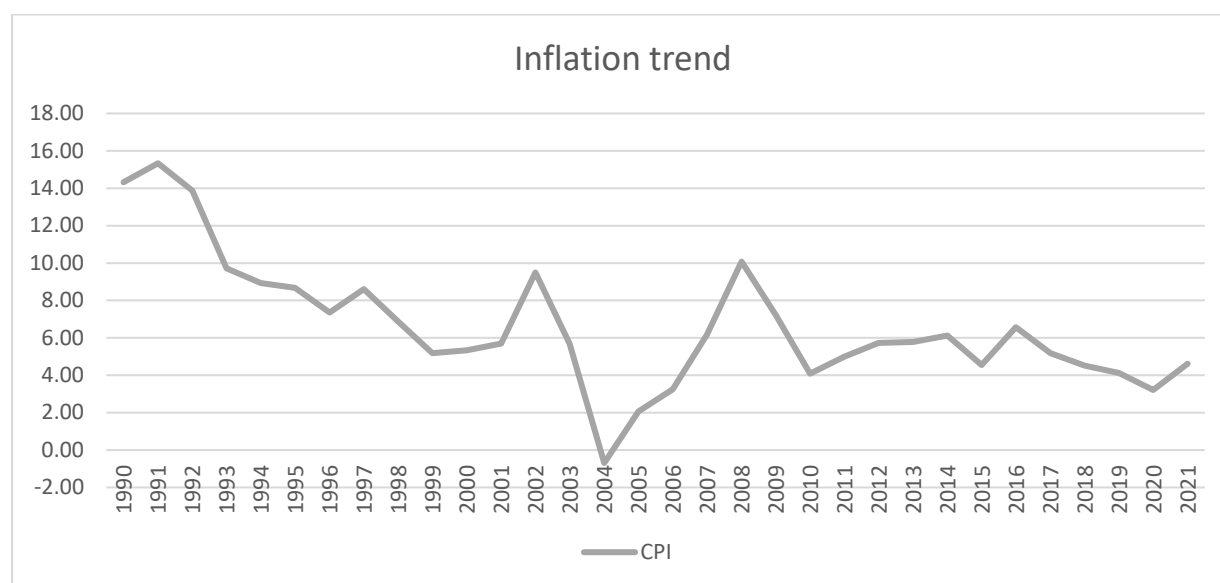
Figure 2.2. Inflation trend

2.2.3. Interest rate trends

The environment of interest rates influences the performance and returns of any given investment. In response to fluctuations in the demand and supply of loanable funds on the financial market, interest rates have fluctuated. The interest has been increasing since the year of 2012. Looking at *Figure 2.2* the interest rate in South Africa experienced a rise from 6.4 percent in 2010 to 7.0 percent in 2019. This increase in interest rates coincided with a decline in household debt, which decreased from 72 percent in 2010 to 62.2 percent in 2022. Over the years, inflation exhibited fluctuations, with a notable decrease observed in 2020. This decrease occurred during a period of low interest rates and high levels of household indebtedness. The financial environment in South Africa following the Covid-19 pandemic has been marked by the implementation of a stricter monetary policy approach. The South African Reserve Bank (SARB) has consistently raised the repo rate in order to mitigate the escalation of inflation. As an illustration, within a span of fewer than 18 months, the repo rate has undergone a substantial increase of 425 basis points (equivalent to a 106% rise), ascending from 4% in January 2022 to 8.25% in May 2023.
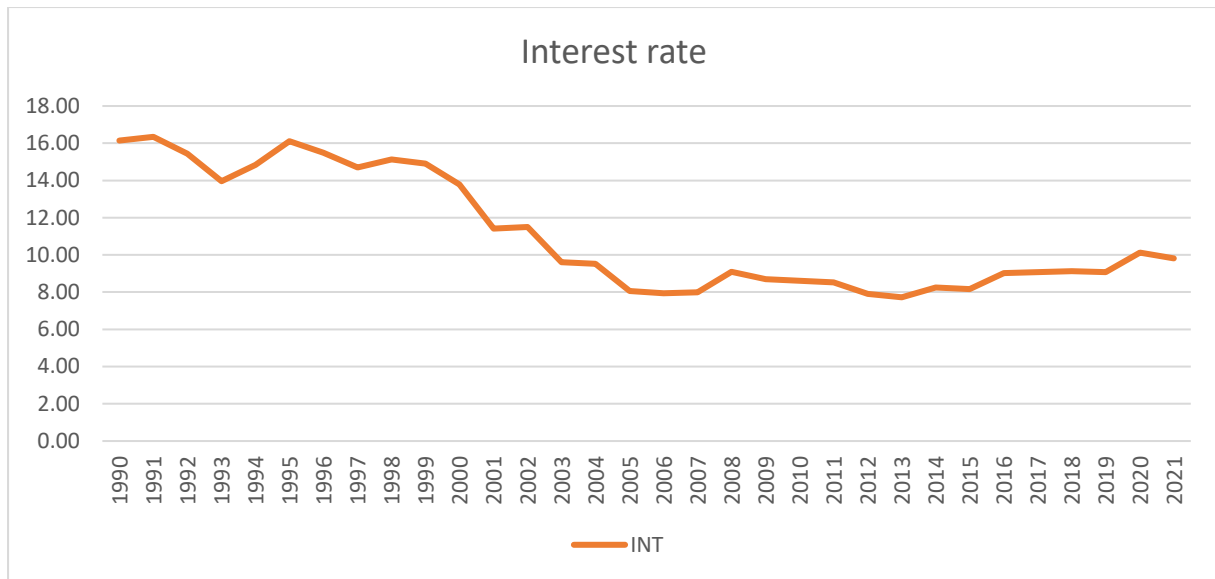
Figure 2.3. Interest rate trend

2.2.4. Household debt response to shifts in inflation and interest rate

As economic theory suggests, monetary policy plays a critical role in the way the central bank controls its money supply and hence the whole monetary system of the country (Maggio, et al., 2014). The South African interest rate rose from 6.4 percent to 7.0% between 2010 and 2019. Therefore, household debt dropped from 72% in 2010 to 62.2% in 2022. When interest rates were low (10.2%) and household debt was high (3.21%) in 2020, inflation began to fall. Post-Covid-19, South Africa's financial system has adopted a more restrictive monetary policy. The South African Reserve Bank (SARB) raised the repo rate to combat rising inflation. Interest rate in South Africa have increased significantly since the Covid-19 pandemic. Data collected from South Africa for this study indicates that the household debt is influenced by the shifts in monetary policy. In 2005 when the interest decreased, with high inflation household collected more debts, which could be of results that they used for consumption. In 2008 the interest rate was low and inflation started to decrease, household continued to borrow more, the increase in household indebtedness was due to household recovering from the Global Financial Crisis. Amid Covid-19 pandemic inflation went up, interest rate increases as it was used by SARB as the tool to fight inflation, household debt decreased.
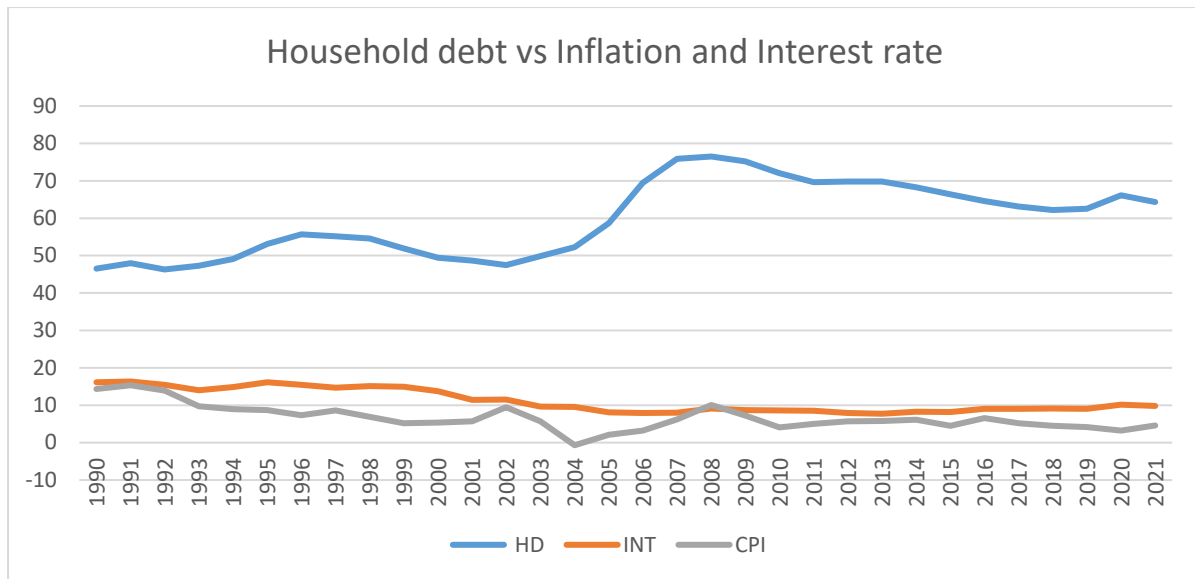
Figure 2.4. Household debt vs inflation and interest rate

2.2.5. Household debt behavior vs inflation and interest rate

When considering borrowing, households form expectations about their capacity to repay the loan throughout its duration. Their capacity to make payments depends on their job status and income potential, future home prices, and interest rates. At times, a household's beliefs may be justifiable, yet unexpected events can hinder their capacity to fulfill their financial responsibilities. In some cases, the choice to borrow might be based on overly optimistic beliefs about forthcoming home prices or borrowing expenses. Under these circumstances, households may find themselves over-indebted (Hunt, 2015)*.*

South African households have encountered higher levels of debt as a consequence of inflation, unemployment, and high interest rates, as well as the recent corona virus pandemic. These factors have resulted in a substantial reduction in the capacity to repay loans, as the income-generating potential of individuals has been considerably reduced (Greenwood-Nimmo, et al., 2022). South Africa implemented the National Credit Act (NCA) No. 34 (2005) to guarantee that consumers possess the necessary information and abilities to effectively navigate the ever-changing financial market. Its objective is to protect households that are already in debt and to discourage irresponsible credit practices. Numerous programmes and initiatives were implemented to equip individuals with the understanding required to make informed financial choices, prevent excessive debt, and seek assistance if they are already in debt. It is crucial to acknowledge that the expectation that NCR training will offer comprehensive financial education to all South Africans may not be entirely realistic, despite the fact that there have been criticisms of its efficiency. In order to resolve this matter, it is important that all industry

stakeholders make a contribution and that households assume responsibility (Karambakuwa & Ncwadi, 2021).

In the event that individuals allocate a greater proportion of their disposable income to debt repayment, their capacity to save decreases, which can result in households being more financially burdened and vulnerable. It also leads to a reduction in the amount of money that is available for investment in the economy, which in turn hinders the formation of domestic capital. A decrease in domestic investment results in a slow pace of economic expansion and an upturn in poverty and unemployment. In recent years, South Africa's GDP growth has been declining as a result of a decrease in domestic savings and other contributing factors (Greenwood-Nimmo, et al., 2022).

2.2.6. Interest rate vs household debt/ inflation rate vs household debt graphs

According to *Figure 2.5 and 2.6,* from the year 1990 household debt has been fluctuating until in 2002 where it shows a sharp upward rise. This could be the results of the decreasing interest rate and inflation over the years. In 2006 the inflation rate started to increase, this resulted to an increase in interest rate, as per SARB monetary implementation the interest rate is used to fight inflation, which encourages investments and grow the GDP leading in households to borrow less money, hence the decrease in household debts in the period of 2006 to 2019.
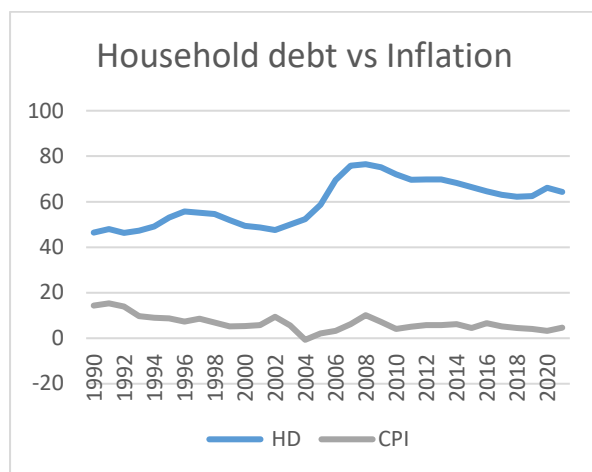
Figure 2.5. Household debt vs inflation   *Figure 2.6. Household debt vs interest rate*
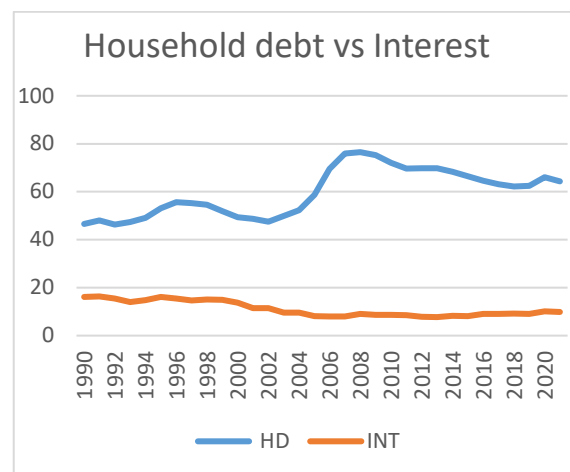
2.2.7. Nation Credit Act (NCA) 34 of 2005

The consumer credit market in South Africa is complex and multidimensional. The National Credit Act, which was implemented in 2006, serves as its primary regulatory framework. The Act's primary objective is to safeguard consumers from excessive debt and to establish instruments or mechanisms to alleviate the burden of excessive debt on the populace

(Goodwin-Groen & Kelly-Louw, 2006). Debt review was implemented by the Act as one of the mechanisms to mitigate over-indebtedness. Consequently, the National Credit Regulator (NCR) was made official by the National Credit Act 35 of 2005 as the primary entity accountable for the regulation of the national consumer credit market in South Africa (Teshani & Green, 2015). The primary objective of the NCA in 2003 was to create a credit market that was accessible to all citizens, particularly those who had been marginalized by the apartheid system of government. The National Credit Act, 2005 (NCA) was implemented to establish a more appropriate for all credit transactions and a steady credit market. The Act's primary objective is to establish new and enhanced privileges for credit consumers. Consequently, credit providers are obligated to enforce the new and enhanced rights and comply with the NCA (Ojo & Zondi, 2021). The establishment aimed to ensure that companies implement the essential securities when delivering debt-counselling services. Consequently, it is mandatory for all debt counsellors to register with the NCR. March 15, 2006, the Act passed into law. The NCA amends the Usury Act, the Credit Agreements Act, the Integration of Usury Laws Act, and the Exemption Notices Act. Brits (2018) stated that the NCA's objective is to safeguard consumers while maintaining the rights of suppliers, and to cultivate a credit market and sector that is equitable, open, justifiable, accountable, and easily accessible. Additionally, the NCA aims to improve the social and economic well-being of South Africans. The National Credit Act is designed to enhance accessibility and fairness in the credit market. It seeks to regulate consumer credit, elevate the standards of consumer information, eliminate predatory lending and marketing tactics, encourage responsible lending and borrowing behaviors, prevent unwise credit issuance, facilitate debt restructuring for individuals facing excessive obligations, manage credit information effectively, and address inequities in credit practices.

Every credit arrangement created in South Africa or having an impact there that involves non-arm's length parties is subject to the NCA. All natural individuals and some legal persons are covered by the NCA, with a particular emphasis on minor juristic persons. Credit providers are mandated by the NCA to conduct a comprehensive credit assessment prior to getting into a credit agreement with the customer. This evaluation has to assess the consumer's financial situation and ensure that the customer comprehends the rights, obligations, risks, and costs linked with the credit agreement (Brits, 2018). The costs associated with credit experienced a substantial rise leading up to the implementation of the NCA, as evidenced by one-month loan interest rates rising to 30% on a monthly basis, while the ordinary interest rate on micro-loans under the Exemption Notice approached an alarming 90% on an annual basis. The credit

provider's disclosure concerning credit was deceptive, leading to a situation where customers often did not possess a full understanding of the overall cost of credit.

2.2.8. Credit bureaus

According to the NCA (2005), the National Credit Regulator must register and regulate any individual or entity operating a credit bureau in South Africa. Anyone who gets reports about credit information for a living needs to register with the NCA, according to Section 43(1) (Goodwin-Groen & Kelly-Louw, 2006). Further, The NCA stipulates that anyone or any organization that collects and keeps track of data from consumer credit reports, as well as anyone or any organization that issues reports based on that data, needs to register as a credit bureau (NCA, 2005). A credit bureau functions as an organization that specializes in the compilation and examination of credit-related data. It is involved in the assessment of credit applications, the examination of payment histories and trends, as well as the aggregation of various consumer credit information (Adewale, 2014).

Section 26(1) of the NCA (2005) led to the formation of the National Consumer Tribunal. The Consumer Protection Act and the National Credit Act give the Tribunal the power to consider any allegations made by or against the NCR and the National Consumer Commission (NCC). The NCA empowers the Tribunal to decide on any submitted application or claims of banned conduct, to determine whether such conduct has transpired and to issue an order for costs pursuant to Section 147 of the NCA, or to exercise any other powers granted by the NCA (Brits, 2018). Schmulow (2016) The Tribunal is tasked with enforcing the terms of the NCA and the Consumer Protection Act (CPA) by adjudicating issues presented to it and imposing punishments. These include the cancellation of registration for credit providers, credit bureaus, debt counsellors, the suspension of such registrations, the imposition of fines, and the provision of consumer remedy as deemed appropriate.

2.2.9. Unsecured lending vs secured lending

Unsecured loan is a type of conferred debt to a borrower based on their financial rank, credit record, reputation, and creditworthiness (Dlamini, 2013). The largest lenders of unsecured loans are banks. Life insurance companies and lesser micro moneylenders are among the other institutions. Credit facilities, short-range credit, and unsecured credit are the three categories of unsecured loans, as outlined in the National Credit Act (Act No 34 of 2005). Unsecured loans are associated with substantial risk due to the absence of collateral or security. The borrower's assets are not subjected to the lender's claim in the event of default. As a result,

lenders impose excessive interest rates on the loan to account for the risks (Anderssen, 2013). Banks impose margins that are linked to the prime rate for secured loans with collateral, but they can charge rates as high as 32% for unsecured loans. Additionally, they impose monthly service charges, credit insurance, and loan initiation fees. Despite the high risk associated with these loans, the returns are sufficient to justify the investment for financial institutions. The ease and speed at which these loans are typically obtained make them a beneficial investment for consumers (Hutchison & Allen, 2021)

Consumers are responsible for the operation of the South African economy. A significant amount of black South Africans has endured and persist in experiencing financial inequality as a result of the apartheid regime. In the present day, the majority of black individuals are still unable to obtain secured credit, and as a result, they pursue unsecured credit. Despite the fact that the unsecured credit market imposes high interest rates, individuals who were formerly in a position of financial disadvantage can now participate in economic activities by obtaining loans from the market. Nevertheless, numerous analysts have cautioned that the continued expansion of the unsecured credit market could result in a significant number of South Africans being heavily indebted (Becchetti & Conzo, 2013). When analyzing the quantity of debt in South Africa, it is important to consider it from two different angles. Initially, from the perspective of consumer credit at the affordability level. Secondly, in terms of the aggregate level of indebtedness among South African consumers (Adewale, 2014). Alternative credit options, such as unsecured loans, are becoming increasingly popular among individuals who were previously qualified to receive secured credit. Despite the fact that the South African Reserve Bank (SARB) continues to be content with the existing levels of unsecured loans in the credit market, the bank continues to keep a close eye on the risks that are connected with unsecured credit (Becchetti & Conzo, 2013).

The over-indebtedness of households in South Africa has increased significantly in comparison to their income over the years (Jame, 2014). The current account deficit that South Africa is experiencing is anticipated to be alleviated by households that increase their savings rates, which will reduce the pace of credit expansion. The poorest households are those with the maximum debt-to-income ratio, as demonstrated by additional research. Edmiston (2011) contends that unsecured lending enhances the economy and assists the underprivileged. According to their perspective, the previously economically disadvantaged now possess access to finance., which enables them to fulfill their fundamental survival requirements. This platform enables customers to finance their vehicles, mortgages, and enterprises, according to

lenders of unsecured loans However, acknowledged that credit providers exploit uneducated consumers who frequently engage in debt spirals. Debt spirals are typically the result of individuals utilizing new borrowing to pay off previous ones. Approximately 50% of individuals in South Africa are unable to afford to take out loans. In the past, lenders were permitted to deduct funds from a borrower's payslip; however, this practice has been prohibited. Lenders are increasingly subjected to default, especially when debts lack substantial collateral security (Mirruy & Mushava, 2018).

2.3. Summary

The chapter is an inclusive overview of monetary policy implementation, explains the trends in household debt in South Africa. It includes statistics and graphs of the inflation and the interest rate for the year spanning 1990 to 2021, interest rate and inflation changes versus household debt behavior, the regulation of debt in South Africa, such as the National Credit Act, credit bureaus, secured vs. unsecured lending, debt protection in RSA, and other associated issues.

CHAPTER 3. LITERATURE REVIEW

3.1 Theoretical framework

3.1.1. The Debt Overhang theory

Looking at existing literature it came as a highlight that the South African households face a huge challenge when it comes to debt. The debt overhang theory is the best description of the situation faced by many South African households. This theory holds significance for the study as it explains the challenges experienced by indebted households, they get restricted to get more money from lenders as they already have debts they are unable to recover. Literature gives evidence that the households borrow money to finance their consumption and end up not being able to repay the debts. Taking it to the banking industry, people with too many debts or falling behind on payments are most likely to not qualify to lending money. Indebted household normally do not have investment since they use any income to finance their debts. The more people are having debts, the more they seem to be vulnerable to get more funds from any source, and they are hindering the economic growth.

The debt overhang theory is explained as the challenge faced by entities be it a business, government, or household when burdened with excessive debt. This situation restricts their ability to secure additional funds, even if the borrowing would yield profitable returns that outweigh the costs. Debt maturity has an impact on debt overhang by decreasing the motivation for borrowers with high leverage to make tangible investments, as some of the value goes towards paying off the debt (Douglas & Zhiguo, 2014). During this study it came to light that many households are no longer allowed to borrow money from banks since they are seriously indebted and proved to be unable to repay the debt. Consumer debt delinquencies can be attributed to an authentic incapacity to fulfill financial obligations when resources are limited. The theory posits that individuals will strive to avoid falling behind on their debts as long as their income is enough to comfortably cope with their repayment obligations (Bhutta, et al., 2010). Households with significant levels of debt are seen as a major factor in affecting and preventing economic growth. The slowdown occurs because the country loses its appeal to private investors. The burden of debt consumes such a large portion of the household's income that their ability to invest or save is greatly reduced. It is evident that debt overhang can arise not only from excessive household debt, but also from changes in household circumstances that make it challenging to manage debt levels. These conditions can arise due to negative economic shocks or ineffective economic policies (Muhammad , et al., 2016).

3.1.2. Monetarist theory

Interest rate is determined by money supply, a decrease in money supply increases interest rate making it pricier for people to take out loans. Higher interest rates discourage households from borrowing but encourage investments which grow the GDP. Considering the data used for this study, when the interest rate increased household debts decreased, due to the results of this increase being that money supply also decreased. The monetarist theory contributes to the study being able to analyse the relationship between the monetary policy and the effects it has on household debt. It explains how shifts in the monetary policy affect the money supply in the economy which results in household debt behavior. A shift in the money supply is the primary driver of economic activity, according to monetarist theory. It argues that central banks, which control the levers of monetary policy, can have a major impact on rates of economic growth by modifying the quantity of money and other liquid assets in circulation in an economy (Liberto & Kelly, 2021). Not everyone agrees that there should be more money in circulation. Some economists say that this kind of behavior could lead to a lack of self-control and, if not managed properly, a rise in inflation. This could, among other things, make savings less valuable, cause uncertainty, and make businesses less likely to spend. The liquidity preference theory considers central bank money supply and money demand to establish the equilibrium money level. This equilibrium makes the interest rate a monetary phenomenon. Assuming the money supply is exogenous, any increase will lower interest rates when money demand and supply are equal. Reduced interest rates boost marginal capital and investment efficiency, increasing output (Twinoburyo & Odhiambo, 2018).

3.1.3. Neo-classical theory of interest or loanable funds theory of interest

Household high demand for funds increases the interest rate, for the banks and other lenders to make huge returns. In relation to this study the theory explains that when household borrow more to finance consumption the interest rate increases and that pause a challenge in debt payments. According to this theory, the interest rate is dictated by the demand and supply of loanable money. Neoclassical economists took into account not just saving, but also bank credit and disinvestment of savings, while the classical theory of interest focused solely on saving derived from current income. The loanable funds theory is an advancement above the traditional classical theory of interest. Classical theory posits that only savings are available for investment, while the loanable funds theory of interest, proposed by neo-classical economics, identifies hoarded wealth, bank loans, and disinvestment wealth as supplementary sources of funds accessible to debtors for investment purposes. The loanable funds theory of interest

incorporates the savings from the classical theory, along with bank loans, dishoarding, and disinvestment, hence it is commonly designated as both the real and monetary theory of interest. Consequently, real and monetary theory are essential (Rajesh, et al., 2018). According to the above information on the loanable theory of interest, the demand for consumption loans will raise the interest rate above what it would otherwise be.

3.1.4. Keynes liquidity preference theory

South African households borrow money based on their future expected income, an increase in income encourages households to borrow more. High interest rates should encourage investment, but that is not what is happening in South Africa. In South Africa's context household debt is extremely high and households borrow money for consumption or to finance other debts, decreasing investments therefore the economic growth declines, this have been observed on the data used in this study. This theory gives an indication of the Keynes suggestion on household's behavior in relation to interest rate shifts. The liquidity preference theory posits that the interest rate influences the amount of cash individuals opt to retain. The rationale for this is that the interest rate represents the opening cost of maintaining liquidity: it reflects the potential earnings forfeited by storing money in non-interest-bearing forms. When interest rates increase, individuals choose to retain a smaller portion of their money in liquid assets (Rajesh, et al., 2018). According to Keynes, the interest rate is fundamentally a monetary phenomenon, serving as a reward for relinquishing liquidity. It is established in the money market through the intersection of money demand and supply. (Rajesh, et al., 2018). Keynesianism explained why prices are set in stone and how money supply changed quickly. Money demand depends on income and interest rates, according to the liquidity preference theory. The theory also links production and interest rate positively based on the liquidity preference-money supply relationship (LM curve). Since the IS-LM model assumes a constant price level, it can only examine production, not short-term inflation (Twinoburyo & Odhiambo, 2018).

The classical monetary theory, the earliest well-known theory of monetary policy, serves as the foundation for the Irving Fisher QTM, which establishes the relationship between monetary policy and economic variables. In this theory, the velocity of money and output are both assumed to be constant. Consequently, any increase in the money supply will ultimately lead to a price increase that is proportional to the quantity theory. Both short- and long-term effects on the money supply were neutral, and only genuine causes had an impact on long-term growth. (Gali, 2008; Mankiw and Taylor, 2006). Keynes contended that the velocity of money is

variable and not fixed, leading him to dismiss the quantity theory both on theoretical grounds and as a practical policy instrument. Furthermore, QTM assumed the absence of a trade-off between output and inflation (Mankiw & Taylor, 2006).

3.1.5. Keynesian consumption theory

This theory is in support of this study as it defines the challenges faced by household in terms of indebtedness due to the changes in monetary policy. it mentions that consumption is based on future income, households take loans or any funds with the perspective that they will be able to pay them using their income, not considering the monetary policy effects on income, consumption and debt repayment. Shocks in the monetary policy may result in households not having enough money to finance their livelihood and falling behind on debt payments. The Keynesian consumption theory, established by Keynes in 1936, claims that household expenditure is dictated by the present income. Khan (2016) elaborated that there exists a disparity between household spending and present income, which is bridged by resorting to household borrowing. This theory applies to this study, the theory bases its speculations on the irrationality of household behavior, as they regard income as the sole determinant of expenditure. Nevertheless, subsequent research revealed that expenditure was a percentage of disposable income rather than a function of it. Economic models of consumer behavior have acknowledged that consumers take into account their lifespan resources when making consumption decisions, rather than relying solely on their current income, as noted by (Hall, 2021). Additionally, Mutenzo (2014) confirms that household consumption is dependent upon prospective future income, as opposed to current income, as it was in the past. This study is relevant to Keynes assumptions regarding credit and consumption, as the theory implies that consumption is dependent upon current income, which is not always the case. Considering the literature related to this study household take into account both the present and the future when making decisions regarding consumption and saving. According to Backer and Shabani (2010) the household's ability to consume in the future will be reduced as a result of the consumption in the present period and the reduction in savings. This forces them to make a decision between consuming now and in the future, which is a trade-off. Additionally, it is possible to believe that households are employing the remaining income that is neither being saved nor consumed to satisfy their debt obligations. Nevertheless, the household will dis-save when the consumption level is beyond the income level, thereby indirectly reflecting the borrowing concept.

3.1.6. McKinnon & Shaw theory of financial liberalisation

McKinnon Shaw suggested that the liberalization of interest rates in developing countries will result in high real interest rate, which will in turn stimulate investments, increase savings, and ultimately contribute to economic growth. McKinnon and Shaw focused on the importance of alleviating financial repression through the establishment of market-determined real interest rates and the elimination of credit control, among other measures. They said that control would lead to low savings, high spending, low investments, and slow economic growth. The McKinnon–Shaw framework is based on the idea that market distortions happen when there is financial control (Savanhu, et al., 2011).

Financial liberalization is the process of eliminating the controls and restrictions that a governing authority has imposed on the financial sector. They believed that the liberalization of the financial sector would result in an increase in savings, encourage investments, and stimulate economic development. When the government exercises control over the financial sector, it will result in a reduction in savings and discourage investment. This lack of investment in an economy will hinder economic growth. They contended that financial liberalization is the optimal course of action for an economy, particularly one that is in the process of development. This concept gained prominence as many developing economies liberalized their financial sectors under the Bretton Woods Institutions and Washington Consensus. The IMF and World Bank created the "structural adjustment program (SAP)" to liberalize distressed economies, which was included in the economic policy recommendation (Anthony-Orji et al. 2015).

Adjasi (2007) carried out a study to evaluate the McKinnon complementarity hypothesis concerning the relationship between money and investment. The findings demonstrate that there is a positive correlation between investment and money demand, and that domestic credit has a favorable impact on investment. This indicates an inverse connection between money and investment. Nevertheless, the demand for money is not substantially influenced by the interest rate. Contrary to McKinnon's claims, the interest rate has a negative impact on money demand in the short term, despite its positive correlation with investment. Therefore, the savings effect could not be the explanation for the correlation between money and investment resulting from the liberalization of interest rates and the increase in money balances.

3.2. Empirical literature

The current context, which includes a weak post-Covid-19 economic recovery, tightening monetary policy, constrained domestic and global financial conditions, slow economic growth, and rising food and fuel price inflation, offers a distinctive framework to examine and re-examine the problem of monetary policy and household debt. Low-wage industries were the most severely impacted by the Covid-19, which increased the risk of consumer loan defaults because the shutdown had an impact on borrowers with lower incomes. Even though the aggregate burden of household debt appears to be manageable, the macroeconomic effects of the distribution of household debt on low-income debtors can increase risk. The results of this study will demonstrate whether monetary policy should continue on its current course of maintaining the target interest rate or whether it should be more accommodating. Based on past studies this study perceive that the country requires accurate forecasting to facilitate the formulation of new policies or the modification of existing ones.

According to textbook intertemporal substitution effects, it makes sense to speculate that tighter monetary policy will encourage households to borrow less (Fagereng et al., 2021). On the other hand, higher interest rates may result in slower income growth and weaker debtor cash flows to support repayment, which could have the reverse effect on indebtedness as indicated by debt-to-income ratios. Even the empirical topic of how household indebtedness responds to monetary policy is unresolved due to the lack of accurate documentation of these conflicting pressures. Fagereng (2021) stated that debt is probably not impacted by changes in monetary policy, according to a point that has been stressed in policy discussions, because people change their debt mostly in connection to occasional housing transactions. Research paper done by Canakci (2021) intended to draw attention to how China's monetary policy has affected family debt. Time series data, a co-integration test, an Augmented Dicky Fuller (ADF) and PP test (PMG) technique, and an ARDL approach were all used in the study. The results of a quantitative analysis employing a time-series model reveal that household debt is positively impacted by GDP per capita and interest rates, but not significantly by CPI. Household debt responds to an increase in income more in a short-term variables connection than in a long-term one. Additionally, in the short term, the effect of interest rate fluctuations on household debt is less than income. There should be certain limitations on consumer finance and household debt, and for this reason, appropriate leverage mechanisms should be implemented in order for the central bank to maintain stable macroeconomic conditions. This study uses the same methodology the ARDL approach to examine how monetary policy shocks affect

household debt in South Africa. In contrast to earlier research, this one is anticipated to provide different findings. Interest rates are predicted to have a negative effect on household debt, while inflation is predicted to have a positive effect. This outcome could be attributed to the usage of additional household debt-driven factors.

Mortgages with adjustable rates are found to be more sensitive to monetary policy shocks than those with fixed rates, as rising interest rates both slow demand growth and increase mortgage payments. Rising household debt has at least temporarily been linked to higher private expenditure. This makes sense because customers might spend more when a debt is collected (Canakci, 2021). Previous research has demonstrated a correlation between rising home prices and low interest rates and household debt growth. Few studies, meanwhile, have empirically looked into how inflation, household spending, and interest rates affect one another. The household expenditure does affect the household debt in this study using the Autoregressive Distributed Lag (ARDL) approach to co-integration, but there is a negative relationship between inflation and interest rates and household debt. Emiris and Koulischer (2021) regressions verified that a higher household debt is associated with low interest rates. Son and Park (2019) studied the mechanisms through which U.S. interest rates are transmitted to domestic interest rates using a Bayesian VAR model (vector auto-regression). However, if several negative shocks, such as accelerated principal repayment plans, are paired with rising domestic interest rates, housing prices will begin to fall, and the onset of a serious crisis, the ratios of vulnerable households may quickly rise.

3.2.1. Interest rate on household indebtedness

While there is ongoing debate regarding the best course of action to resolve the debt crisis, the majority of research indicates that reducing household debt can facilitate long-term economic growth. Therefore, from both macroeconomic and microeconomic viewpoints, reasonable household debt ratios and allocations are crucial (Son & Park, 2019). Son & Park (2019) demonstrated that households with some wealth and the ability to borrow against future revenues are the ones who borrow more when the interest rate falls. Particularly over the past five years, household debt in China has increased significantly. In order to avoid repeating past errors, the country needs accurate projections that can aid in the creation of new policies or the modification of existing ones. The study aimed to shed light on the relationship between China's monetary policy and household debt levels. The scope of the investigation extended from 1996 to 2020. A quantitative analysis employing a time-series model revealed that household debt is positively influenced by per capita GDP and interest rates, but not to a

significant degree by CPI. The relationship between household debt and an increase in income is more reliant on short-term variables than long-term variables. Additionally, the effect of interest rate fluctuations on household debt is less than income over the short term. Canakci (2021) conducted a study on the impact of monetary policy on household debt in China. Based on the analysis, it appears that GDP per capita and interest rate play a crucial role in influencing household debt, while CPI does not seem to have a significant impact. The study revealed that short-term income increases have a greater influence on household debt changes than long-term increases. The central bank can maintain strong macroeconomic conditions by implementing restrictions on household debt and consumer financing, along with appropriate leverage measures. The research suggested that in order for the central bank to maintain stable macroeconomic conditions, it is important to implement certain limitations on household debt and the consumer finance options available to citizens.

Household debt-to-income ratios can fluctuate due to primary deficits or "Fisher effects" caused by interest rates, income growth, and inflation. Using Norwegian microdata, the impact of monetary policy on household debt by debt level was evaluated. Channel (a) decreases debt-to-income ratios in response to rising interest rates, whereas channel (b) increases them. Even in households with elevated levels of debt, where Fisher effects are pronounced, Channel (a) predominates. Nevertheless, in the absence of a noticeable effect on debt-to-income ratios in indebted households facing a high risk of unemployment illustrates that monetary policy has restricted influence over debt in areas where the highest risks are concentrated (Fagereng, 2021). Over the past 20 years, household debt has significantly increased as a result of lower interest rates and a relaxation of liquidity limitations. The rise in household debt has heightened the sector's sensitivity to changes in interest rates, income, and asset prices. The heightened sensitivity is more pronounced in areas where variable-rate mortgages are more common compared to fixed-rate mortgages.

Recent declines in interest rates have been correlated with an increase in household debt in many nations. Utilizing a formalized household financing model with credit restrictions. Emiris & Koulischer (2021) conducted a study using data from the Belgian household credit registry, demonstrated that the majority of the increase in household debt over the past several decades was attributable to middle-aged borrowers who already own a property. The study discovered that households with greater housing wealth and fewer financial constraints borrow more when interest rates decline The influence of the interest rate is determined by combining regulatory data on banks' overseas exposures with branch location data. They determined that a 1% decline

in interest rates is associated with a 15% rise in household debt. (Floden, et al., 2020) investigated the impact of monetary policy on household spending in situations where households have debt and the interest rates on their loans are tied to short-term interest rates. According to the findings, households with significant debt in relation to their income are significantly more responsive to fluctuations in the monetary policy interest rate than households with minimal or no debt. Understanding the impact of monetary policy on households with mortgage loans is crucial (Floden et al., 2020). The consumption patterns of these households are closely tied to the interest rate fixation of their mortgages. They also noted that the findings were influenced by households with a significant portion of their debt tied to contracts that adjust interest rates based on short-term interest rates. This suggests that changes in monetary policy have a rapid impact on interest expenses.

As per Oxford-Analytica (2019) findings, public banks engage in interbank loans with the central bank. Changes in the interest rate directly impact these short-term loans. When the central bank decides to lower the interest rate, financial institutions have the opportunity to borrow from the central bank and increase the overall money supply. Various factors, including assumptions about potential interest rates influence interbank long-term rates. When central banks lower their interest rates, the market tends to anticipate that they will remain low. As a result, long-term market rates align with these expectations. In addition, the process of financial liberalisation, particularly the implementation of low-interest rates, has resulted in a significant increase in household debt.

South African households increased their debt acquisition, even during rising credit costs, which contradicts theoretical expectations. The study done by Molefe and Mutezo (2025) aimed to ascertain household's borrowing responses to interest rates and the influence of credit demand on interest rates in South Africa. They validate observations that a low interest rate environment promotes borrowing and conversely.

3.2.2. Inflation on household indebtedness

While various perspectives exist regarding inflation, it is generally accepted that it is caused by a persistent increase in prices. A continual general increase in the prices of goods and services is characterized as inflation in an economy. It could be described as an ongoing increase in prices as determined by an index like the consumer price index (CPI) or the implicit price deflator for Gross National Product (GNP). Liman (2021) argued that price stability is essential for the growth of the financial industry because high inflation rates discourage long-

term contraction, exacerbate informational asymmetry, and increase moral hazard. Simply said, inflation is an ongoing rise in the level of prices in society. It describes the rate at which prices are increasing generally for goods and services, which causes buying power to decrease. Ntakirutimana (2022) saw inflation as a broad and continuous rise in the cost of goods and services throughout an economy. It might also be seen as a continued rise in the price level overall. The consumer price index change as a percentage is used to calculate the inflation rate.

In recent years, central banks have made an effort to stimulate demand by guiding inflation expectations, as noted by (Lieb & Schuffels, 2022). Consequently, the reaction of consumption to anticipated inflation has increased. The research examined whether the consumption response to expected inflation is influenced by the various components of household's balance sheets. The increase in inflation expectations might elevate spending by directly enhancing anticipated real wealth, especially for households with nominal financial obligations. Expected inflation can affect wealth by affecting the real interest rate if households are neither budget-constrained or liquid enough to switch between consumption and saving. Risky asset investments and net worth affect predicted inflation and durable expenditure decisions.

(Coibion et al. 2018) emphasised that economic activity is more positively impacted by higher inflation expectations during periods of fixed nominal interest rates. Stability of price levels is a critical factor in the stimulation of economic development. Therefore, monetarists focus on two primary objectives: sustainable economic growth and a moderate rate of inflation (Orkideh and Sunhyung, 2022; Madurapperuma, 2016).   According to Dubelle (2004) higher inflation rates and higher nominal interest rates cause upfront payments to decrease significantly as a percentage of income while later payments increase. Although the repayment's nominal value stays the same, their real value rapidly decreases due to a larger growth in nominal household income. A mortgage of the same size with lower inflation has smaller upfront payments compared to income, but the loan's life expectancy declines more slowly as the debt's real value is depleted. Households can now borrow more money for a given debt service limit due to the reduction in nominal borrowing rates that has coincided with declining inflation rates. Valderrama et al. (2023) discovered that properties in rising market economies including Turkey and other parts of Europe were over valued. Under such circumstances, unsustainable household debt dynamics result from a property price bubble driving a household debt bubble.

3.2.3. Financial literacy

People need to be financially informed to make financially wise decisions. It is suggested by the findings of Berhman (2012) that the impact of schooling on individuals is only favorable when it is combined with a certain level of financial literacy. According to this study it is important for households to be well informed to be able to make positive financial decisions. There exists a strong positive relationship between financial literacy and educational attainment with wealth outcomes. It is suggested by the findings that the impact of schooling on individuals is only favorable when it is combined with a certain level of financial literacy. The extent of the estimated impacts suggests that allocating resources towards enhancing financial literacy could yield significant returns in terms of wealth accumulation (Berhman, et al., 2012). Financial literacy is regarded as one of the most influential characteristics in determining an individual's behavior in the financial world, as well as their attitudes toward payment discipline, debt, and planning for the future. In this regard, it is essential to emphasize financial education as a means of enhancing and fostering practical financial literacy (Krechovská, 2015). Gathergood and Disney (2011) show in their study that households lacking financial literacy have a lower net worth, rely on credit with higher costs, and demonstrate an increased likelihood of reporting credit arrears or encountering difficulties in debt repayment. Nevertheless, it may be argued that households with a higher level of financial literacy are more inclined to simultaneously own liquid savings and revolving consumer credit, indicating that this co-holding may be a consequence of sensible financial decision-making. The authors acknowledge the possibility of endogeneity in the context of financial literacy. Emphasising financial education is crucial for enhancing and promoting financial literacy, as well as reducing the negative effects associated with low levels of financial literacy. Financial education covers the systematic initiative undertaken by individuals to enhance their comprehension and awareness of financial principles, services, and products. Therefore, it is essential for financial education to encourage consumers to actively participate and foster comprehension and acknowledgement of personal accountability in regards to financial management.

Financial literacy should enhance the ability to make informed financial decisions, such as those related to debt (Ward and Lynch 2019). Nguyen et al. (2019) argued that financial literacy had a substantial influence on debt. Darriet et al. (2020) identified two main causes for people spending more than they earn. Firstly, individuals with low incomes struggle to meet their essential expenses. Secondly, individuals with high earnings tend to have a higher

propensity to spend and a lower inclination to save. Risk perception refers to an individual's perceptions of risk during the decision-making process (Darriet et al., 2020). Research has shown that individuals who have high expectations may miscalculate the level of risk involved. Conversely, individuals who perceive higher levels of danger tend to have lower levels of debt, as demonstrated by (Nguyen et al. 2019). In a study conducted by Kurowski (2021), the objective was to determine if households with higher levels of financial and debt literacy have better budget management skills, hence reducing the likelihood of individuals defaulting on their obligations. Individuals with a greater understanding of debt are more equipped to handle credit obligations, while the significance of financial literacy declines. The findings indicate that credit experience has a significant impact on the extent of over-indebtedness. Individuals who have previously paid off their mortgage loan encounter fewer difficulties in meeting their current credit commitments compared to those who have experience with consumer lending.

Lusardi and Tufano (2015) discovered that individuals with limited understanding in this field tend to perceive their debt as being excessive. Additionally, a lack of knowledge about debt leads individuals to borrow money at a higher expense. Huston (2012) conducted a study to analyses the influence of financial literacy on borrowing expenses. This study examines the correlation between financial literacy and the expenses associated with borrowing money through housing loans and credit cards among consumers in the United States. The findings of this study suggest that individuals with a high level of financial literacy are twice as likely to benefit from reduced expenses when it comes to credit card and mortgage loan financing. Brown et al. (2016) examined young American's debt habits and financial literacy. Mathematics and financial education improve repayment behavior. Higher education also reduces excessive debt greatly. Nevertheless, the significance of education in debt management diminishes amongst the corona virus pandemic Kurowski (2021).

3.2.4. Macroeconomics effects

The huge spike in family debt has added to China's resident's concerns about economic stability. China is attempting to stabilize its economy by increasing its consumer spending (Canakci, 2021). Historical research indicates a correlation between rising household debt and more severe macroeconomic recessions and financial crises. Poor macro-ecomic performance play a role in driving household debt. Recent events are consistent with this pattern, as the 2008 financial crisis's macroeconomic repercussions were more severe in regions where family debt had increased prior to the crisis. Higher interest rates could lead to slower income growth and

weaker financial flows from debtors to support repayment, which could have the opposite effect on indebtedness as measured by debt-to-income ratios (Fagereng, et al., 2021). Emiris and Koulischer (2021) mention that large amounts of household debt and low nominal interest rates pose two issues. High household debt is a concern because it can threaten the economy and financial system's stability. The second concern is the distributional effects of excessive household debt in light of lending restrictions. According to Dubelle (2004) whether or not the increase in household debt is sustainable, the higher level of debt has significant macroeconomic effects. The household sector will be more sensitive to changes in interest rates, particularly if they come as a surprise, as well as income fluctuations, notably those caused by unemployment. This increased sensitivity is highly dependent on the proportion of variable-rate mortgages versus fixed-rate mortgages held by households, with the sensitivity increasing more in nations where variable-rate mortgages are predominant. Emiris and Koulischer (2021) said when purchasing a property, borrowers are typically required to put down a certain amount of money. The quantity borrowed in this instance is determined by the borrower's two characteristics. The projected future income of the household comes first. If future income is anticipated to be substantial, households will prefer to allocate more resources to the current period. The money of the household, which can be used as a down payment on the mortgage, is the second factor. If interest rates decline, these two variables will change. It will initially reduce financing costs and generally increase the present value of future revenue. Second, diminished interest rates will increase the value of accumulated and invested wealth, such as bonds and real estate. The second route increases the resources of wealthier, older households that have already amassed wealth, whereas the first route benefits poorer, younger households whose primary resource is prospective income.

Household debt has a crucial role in impacting financial stability. The objective of this study is to assess the influence of household attributes and interest rates on household borrowing. Additionally, to assess the influence of interest rates on the possible hazards associated with home loans and household credits. The findings indicate that the rise in household debt is influenced by both the interest rate and income (Werdaningtyas, et al., 2022). Financial stability is significantly impacted by household debt. In a recent study done by Muhammad (2021) explored the relationship between inflation, interest rates, and output growth in Pakistan. Their research shed light on how these factors affect the country's economic landscape. They proposed that the central bank should focus on keeping inflation and interest rates low in the short and medium term rather than excessively prioritising these factors in the long term.

Changing interest rates will impact a greater number of households than an increase in unemployment (Emiris & Koulischer, 2021). The primary type of mortgage that households have, either fixed or variable, significantly influence the degree of sensitivity of the household sector to changes in interest rates. A change in the interest rate regime will have an imbalanced effect on households. When the interest rate regime takes a downward turn, it creates a favorable opportunity for current borrowers to consider refinancing their mortgages at a lower interest rate. As mthly mortgage payments decrease, this, in turn, increases the amount of household income available for consumption. This occurs differently depending on the cost of refinancing.

3.2.5. Implications for financial stability and monetary policy

The domestic sector's access to credit has increased significantly as a result of deregulatory and innovative financial practices. And the sustained economic growth has made households more comfortable with taking on debt. The value of household assets has increased substantially, offsetting the rise in household debt, so that household balance sheets remain in excellent shape overall. Furthermore, the majority of the increase in household debt is held by households that are able to service it. Additionally, the macroeconomic landscape is positive: the economy is growing steadily, unemployment rates remain low, and home prices are increasing across most regions of the country. Consistent with this, while the proportion of households having trouble meeting their debt obligations has increased in recent years, it remains low in historical and international terms (BIS papers & Bank of Korea, 2009).

In order to establish and maintain price stability and promote balanced and sustainable economic growth, South Africa's monetary policy is transmitted to the economy through a variety of channels (SARB, 2023). According to Greenwood-Nimmo (2022) the main mechanism for conducting South African monetary policy refers to the interest rate at which the South African Reserve Bank (SARB) engages in overnight repurchase agreements with commercial banks. For overnight banks borrowing, the repo rate is the benchmark. In order to carry out its constitutionally mandated goal of obtaining and sustaining price stability in the interests of balanced and sustained economic growth, SARB determines the repo rate. Changes in the repo rate have a significant impact on the range of interest rates given by commercial banks, which is a major way in which they have an impact on the whole economy. Changes in bank interest rates have an effect on how much it costs people to borrow money from external sources and how much it costs them to hold liquid assets. the spread to the repo rate is positive and significantly widening in the time immediately following the global financial crisis. For

home loans, this widening has slowly continued, but for business loans, it has stabilised. After the global financial crisis, the historically low repo rate may raise mortgage rates on new loans, according to the expanding difference between household mortgage rates and the repo rate, which is of worry to policymakers (Greenwood-Nimmo, et al., 2022).

To analyze the impact of household debt on policy trade-offs from a modeling perspective, it is essential to evaluate the different ways household debt affects the elements of aggregate demand. The microeconomics literature indicates that household debt can affect consumption decisions via various channels, including fluctuations in debt servicing costs due to interest rate changes, borrowing limitations set by financial institutions, and the impact on consumer's perceptions regarding the debt's effect on their capacity to fulfill lifetime consumption goals (BIS papers & Bank of Korea, 2009). Notwithstanding the micro-level data, household debt has generally been considered insignificant, in conventional monetary policy models. This is partly attributable to macroeconomic modelers' tendency to regard household debt as both an endogenous and passive variable that reflects intertemporal consumption and saving choices. This section first defines a basic benchmark monetary policy model that assigns a passive role to household debt, subsequently exploring the multiple ways in which household debt may assume a more active role, initially as a catalyst for aggregate demand and later as a signal of boom-and-bust cycles.

3.3. Summary

This chapter consist of theoretical framework, where theories underpinning this study are discussed, also includes the empirical literature. The findings of this study seeks to close a gap in the literature by shedding light on whether the current environment characterized by a weak post-Covid-19 economic recovery, tightening monetary policy, tight domestic and international financial conditions, slow economic growth, and rising food and fuel price inflation presents a special framework for revisiting the topic of monetary policy and household debt. It will be clear whether the SARB is successful in keeping inflation under control by adjusting interest rates.

CHAPTER 4: METHODOLOGY

4.1. Introduction

This chapter constitutes the study's methodology. It includes research design, data sources and sampling, model specification, variable definition and expected signs in relation to the dependent variable, estimation techniques and estimation procedures. In addition, the chapter discusses the diagnostic tests, which include multicollinearity, heteroscedasticity, serial correlation, normality and stability.

4.2. Research design

The study seeks to determine the impact of monetary policy shocks on household debt in South Africa, by performing estimation techniques (ARDL), estimation procedure (descriptive statistics and pairwise correlations, unit root, lag length selection, cointegration, error correction model, variance decomposition analysis, impulse response analysis) and diagnostic tests (heteroscedasticity, serial correlation, normality, multicollinearity, model stability). The study therefore follows a descriptive and correlational research design as it seeks to discover relationships among variables and proffer description of those relationships. The design of the study involves constructing an econometric model that seeks to ascertain how one variable called a dependent or outcome variable changes following a shock or change in a particular variable or variables of interest called independent or explanatory variables. The descriptive statistics of the data used is provided in chapter five.

4.3. Data sources and sampling

The study follows a quantitative study approach and the annual data collected cover the period 1990 to 2021 generating a total of 32 observations. The data is obtained from South African Reserve Bank and Federal Reserve Bank of St. Louis. The South African Reserve Bank and Federal Reserve Economic Data constitute the preferred sample of data sources for this study for the following reasons. The SARB is the custodian of monetary and financial data in South Africa and is therefore the most preferred data source. All the macro data is obtained from the SARB covering the whole of South Africa. However, where the data is unavailable at the SARB or where values do not cover the entire study period consistently, FRED data is used. FRED is one of the largest source of monetary data on all countries in the world. The variables included in the study are household indebtedness (HD), interest rate (INT) and inflation (CPI), consumption (CON), unemployment (UNE), economic growth (GDP), debt cost (DEB).

Table 4.1. Summary of data variables and sources

VARIABLE	FREQUENCY	TIME SPAN	SOURCE
Household debt	Yearly	1990-2021	SARB
Interest rate	Yearly	1990-2021	SARB
Inflation	Yearly	1990-2021	SARB
Household consumption	Yearly	1990-2021	FRED
Unemployment	Yearly	1990-2021	FRED
Economic growth	Yearly	1990-2021	SARB
Debt cost	Yearly	1990-2021	SARB

Source: Authors own computation

4.4. Model specification

The study adopts and modifies the econometric model adopted by Fagereng, et al (2021)

$$HD_t = \beta_0 + \beta_1 INT_t + \beta_2 CPI_t + \beta_3 CON_t + \beta_4 UNE_t + \beta_5 GDP_t + \beta_6 DEB_t + e_t \ldots 4.1$$

Household indebtedness (HD) is the dependent variable of the study. It is known as the collective debt of all people in a household, it can include consumer debt and mortgage loans. Interest rate (INT) is the rate charged by banks to its customers. Inflation (CPI) represents the changes of prices. Consumption (CON) consists of the money a resident household spends on things or services that are used to meet needs or wants. Unemployment (UNE) is when someone actively looks for work but can't find it. Economic growth (GDP) refers to increase in country's economy, Debt cost (DEB) is the money paid on a debt.

Table 4.2. Definition of variables and their expected signs

Variables	Variable symbols	Definition	Expected signs	References
Household indebtedness	HD_t	Household total debts, includes consumer debt and mortgage loans.	Dependent	(Dyan and Kohn, 2007)

Interest rate	INT_t	The benchmark price for overnight borrowing. Lower interest rate increases household indebtedness (Fagereng, et al., 2021).	(-)	(Son & Park, 2019) (Canakci, 2021).
Inflation	CPI_t	It is caused by prices that keep going up. an ongoing increase in prices, indicated by indicators such as the consumer price index (CPI) or the implicit price deflator for Gross National Product (GNP).	(+)	(Canakci, 2021).
Consumption	CON_t	Consists of household expenditures on products and services used to satisfy needs or desires.	(+)	(Lombardi & Mohanty, 2017) and (Dyan & Kohn, 2007)
Unemployment	UNE_t	A situation in which a person actively looks for work but is unable to locate employment.	(-)	(Caju & Tojerow, 2016)
Economic growth	GDP_t	A change from one time period to another in the amount of goods and services that a country can produce.	(-)	(Lombardi & Mohanty, 2017) (Canakci, 2021).
Debt cost	DB_t	The effective interest rate or the total amount of interest payable to the lender.	(-)	(Backer & Shabani, 2010)

4.5. Estimation technique

4.5.1. Autoregressive distributed lag (ARDL)

The autoregressive distributed lag (ARDL) model is an ordinary least squares (OLS)-based approach that can be utilized for time series data that are either non-stationary or exhibit mixed orders of integration. However, it is important that none of the variables are integrated of order two, I(2). The choice of the ARDL was informed by the preliminary data properties which showed a mixed orders of integration with none of the variables that are I(2). Moreover, the impact of most macroeconomic variables on the dependent variable is not always instantaneous as there are time lags involved in transmitting the effects on the dependent variable.

4.6. Estimation procedure

4.6.1. Descriptive statistics and pairwise correlations

Descriptive statistics serve as concise informative metrics that define a particular data set, which may reflect either the complete set of a population or a portion. Central tendency and variability are two fundamental categories of descriptive statistics. The mean, median, and mode serve as indicators of central tendency, while standard deviation, variance, minimum and maximum values, along with skewness, represent measures of variability. Pairwise correlation it is done to show the relationship of variables, it uncovers the potential relation of interest. The higher the absolute value is of the correlation coefficient, the stronger is this relationship.

4.6.2. Unit root testing

The unit root test is for determining the series stationarity, the p-value obtained should be less than the significance level (0.05) in order to reject the null hypothesis. The Augmented Dickey Fuller test is a frequently used method to assess if a time series is stationary, and it examines the data for the presence of a unit root. This is crucial to avoid spurious results.

4.6.3. Lag length selection

Lag length selection criteria are employed to identify the optimal number of lags to incorporate in an autoregressive process. The determination of lag lengths can be informed by employing Akaike information criterion (AIC), Bayes information criteria (BIC), Schwarz information criterion (SIC) and Hanna-Quinn information criterion (HQIC). The correct lag length is indicated by the asterisk.

4.6.4. Cointegration

Cointegration is a statistical method employed to explore the linkage between two or more non-stationary time series over the long term or within a specified timeframe. The null hypothesis is that the series in $\dot{y}_t$ are not cointegrated. The null hypothesis is rejected if the computed trace statistics is greater than the critical value. The method identifies parameters or equilibrium in the long term for two or more variables. Cointegration evaluates whether a long-term linear relationship exists between two or more-time series, even if this linear link does not present or is weak in the short term. It aids in ruling out the potential of spurious regression (Wang, et al., 2021).

4.6.5. Error Correction model

Error correction models (ECMs) belong to a class of various time series models that are habitually used for data in which the underlying variables exhibit co-integration, also known as a long-run common stochastic trend. ECMs provide a theoretical framework for assessing the immediate and extended impacts of one-time series on another. As a result, ECMs provide a direct estimation of how quickly a dependent variable attains equilibrium after a change in other variables. The expectation is that the sign of the error correction term must be negative and statistically significant. If it is positive, it means the error correction process is not converging but rather explosive.

4.6.6. Variance decomposition analysis

The analysis reveals the extent to which the prediction error variance of each variable can be recognized to external shocks affecting the other variables. Variation decomposition analysis is a statistical approach that allows the whole variation of an outcome variable to be partitioned. It calculates the difference between expected and actual results.

4.6.7. Impulse response analysis

An important phase in vector autoregressive model-based econometric investigations is impulse response analysis. Their main purpose is to explain how a shock in one or more variables changes the evolution of variables in a model. You can observe how a shock to variable B affects variable A in later periods after estimating a vector autoregressive (VAR) model and expressing it in a vector moving-average (VMA) representation.

4.7. Diagnostic tests

4.7.1 Heteroscedasticity

It is a type of pattern in a model's residuals in which the amount of variation is always higher in some groups of residuals than in others. It is also called "variance that is not constant. The Breusch-Pagan test is the one that is most often used to check for heteroscedasticity. To not reject the null hypothesis, of homoscedasticity, the p-value should be higher than 0.05. Heteroscedasticity makes the coefficient values more spread out. When heteroscedasticity is found in the model residuals, it means that the model was not set up correctly. Some of the things that could cause heteroscedasticity are assuming wrong linear relationships in models, making wrong distributional assumptions, and using linear regression when Poisson regression would be better. Some models work better for certain subgroups of the population than others (Cook & Weisberg, 1983).

4.7.2. Serial correlation

Autocorrelation is a mathematical way to show how much a time series looks like itself when compared to a lagged version of itself over different time periods. Most of the time, the Durbin-Watson test is used to find first order correlations. There are also tests for higher-order autocorrelation, such as the Correlogram Q-statistics and the Breusch-Godfrey LM test. The null hypothesis of the Breusch-Godfrey LM test is that there is no serial correlation of any order up to p. If the p-value of the R-square is less than 0.05 we reject the null hypothesis. Correlogram Q-statistics are used to see if data that moves over time is related. In order to conclude that the model residual does not exhibit serial correlation the p-value of the chosen test must be greater than 0.05.

4.7.3. Normality

A normality test is used to find out if a sample of data comes from a population that is evenly spread out. The Jarque-Bera figure is used in this study. In order to fail to reject the null hypothesis and conclude that the residuals are normally distributed, the probability value should be higher than 0.05. The central limit theorem says that a deviation from normality is not a big deal if there are 100 or more observations in a group (Chandra , et al., 2019).

4.7.4. Multicollinearity

Multicollinearity is a situation in which two or more independent factors are linked or related to each other in some way. Multicollinearity is a problem that usually happens when data are

not gathered or manipulated well enough, or when there are problems with the structure of the data, such as when a variable is added that is calculated using other independent variables. Studenmund (2016) states that it makes the dataset more variable and makes it very sensitive to small changes. It also makes the dataset very sensitive to big changes, makes the regression model less stable, and leads to results that are distorted and unreliable. Another way to find multicollinearity is to use variance inflation factors (VIF). To accept the null hypothesis, the Centered VIF should be less than 5. This means that there is no connection between the variables.

4.7.5 Model stability

An essential premise of the stability test in regression modeling is that the pattern of data on the dependent and independent variables remains constant over the data collection period. This study employs the CUSUM test to assess the model's stability. The model is deemed stable if the CUSUM plot is contained within the critical lines. If this assumption is true, a singular model of linear regression is fitted to the entire data set. Since it is presumed that the parameters will remain constant throughout the estimation and prediction processes, the regression model is estimated and used to make predictions for a specific time period.

4.8. Summary

In this chapter, the methodology of this study was discussed. The variables of the study were defined, as well as the expected relationship between dependent and independent variables. The World Bank and Federal Reserve Bank of St-Louis provide the data for the dependent and explanatory variables for the 32-year period from 1990 to 2021. The diagnostic procedures were conducted to disclose the relationship between the explanatory variables. The decision to use ARDL was informed by the mixed orders of integration. Eviews12 is used in the following chapter to conduct the estimations and tests discussed in this chapter.

CHAPTER 5: ESTIMATION, REPORTING AND DISCUSSION OF THE RESULTS

5.1. Introduction

The study examines monetary policy shocks on household indebtedness in South Africa. In this chapter data spanning from the years 1990 to 2021 is used determine the relationship between the variables. After setting out the analytical framework and reviewing estimation techniques and models in Chapter 4, this chapter estimates the models, followed by reporting and discussion of the results. In the subsequent sections of this chapter, the descriptive statistics of the data under study is provided followed by unit root testing. Various diagnostic tests are performed as outlined in the previous chapter. The ARDL model and the bounds test of cointegration are then estimated and performed, and the results interpreted.

5.2. Robust of Least squares

$$HD_t = 52.5677 - 2.6794INT_t - 0.0509CPI_t + 0.1334GDP_t - 0.0485CON_t$$
$$+ 0.3356UNE_t + +3.4689DEB_t + e_t$$

According to Table 5.1 if INT changes by 1 it will result in HD changing by -2.6794. Any change in CPI will cause HD to change by -0.0509.

Table 5.1. Robust of least squares

Variable	Coefficient	P-value
INT	-2.6794	0.0000
CPI	-0.0509	0.8737
GDP	0.1434	0.8002
CON	-0.0485	0.09244
UNE	0.3356	0.5558
DEB	3.4689	0.0000

5.3. Descriptive statistics of the data

From the results in table 5.2 the mean value indicates the mean for each variable (mean value for HD=59.69, INT=11.13, CPI=6.68). The maximum and minimum value tell the lowest and highest value in each variable. Standard deviation indicates the deviation from the sample mean from each variable.

Table 5.2. Descriptive statistics of the data

Variable symbol	Mean	Max	Min	Std. Dev	Obs.
HD	59.69	76.50	46.30	9.86	32
INT	11.13	16.34	7.72	3.13	32
CPI	6.68	15.34	-0.69	3.44	32
GDP	2.05	5.60	-6.43	2.60	32
CON	4.77	13.40	-2.44	2.66	32
UNE	21.46	25.80	18.700	1.85	32
DEB	8.68	12.50	5.90	1.49	32

5.4. Stationarity and unit root tests

5.4.1. Visual inspection of the data in levels

Figure 5.4.a) Household debt in levels
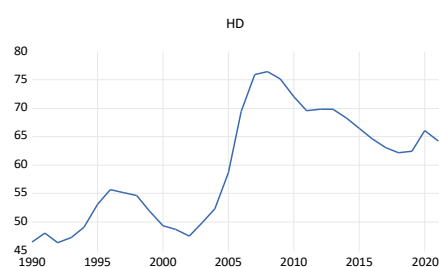
Figure 5.4.b) Interest rate in levels
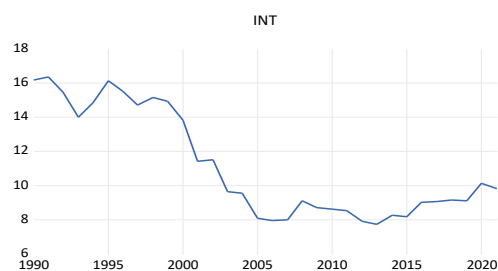
Figure 5.4.c) Inflation in levels
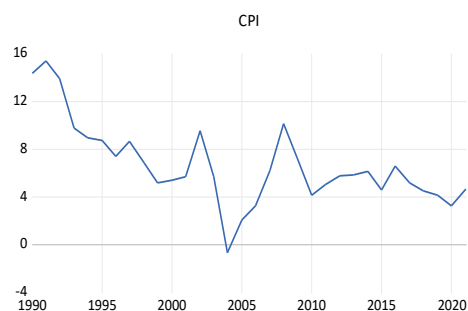
Figure 5.4.d) Economic growth in levels
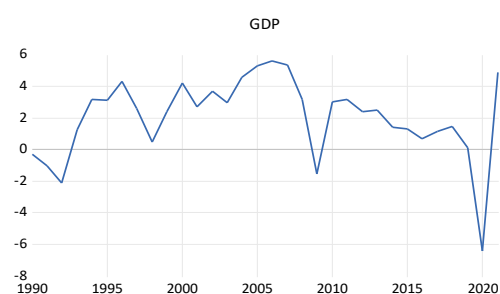
Figure 5.4.e) Consumption in levels

Figure 5.4.f) Unemployment in levels
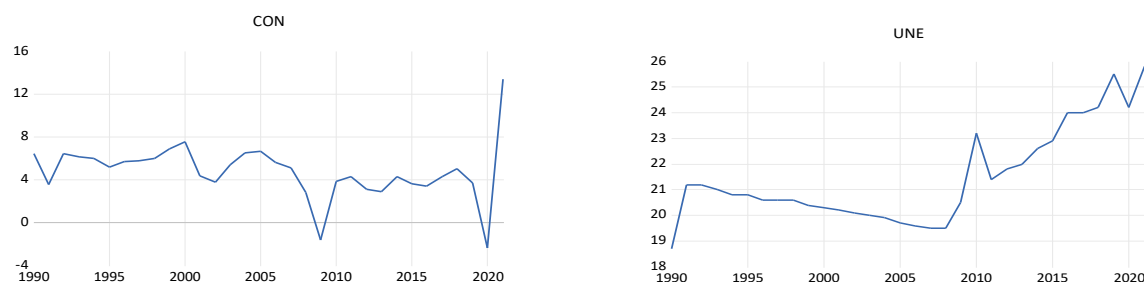
Figure 5.4.g) Debt cost in levels
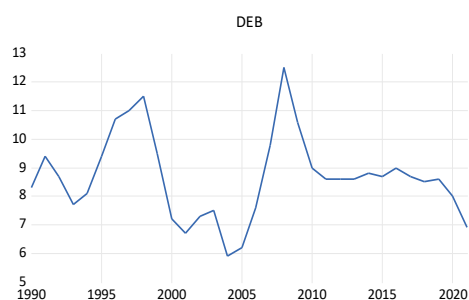
5.4.2. Unit root tests using Augmented Dickey-Fuller test

The study's variables are stationary at I (0) and I (1), meaning their statistical properties remain constant throughout time and do not show trends or seasonality. They suggest that the time series is stationary, it do not reject the null hypothesis The variables that are stationary at first difference have constant statistical differences, indicating the original variable may have a trend but the changes do not. Based on the stationary results the model is estimated using ARDL.

Table 5.3. Augmented-Dickey fuller test results

Variable	Augmented-Dickey Fuller test	P-value	Order of Integration
HD	*1st difference: None*	0.0049	I(1)
INT	*1st difference: None*	0.0029	I(1)
INFL	*Level: Intercept*	0.0120	I(0)
GDP	*Level: None*	0.0128	I(0)
CON	*Level: Intercept*	0.0006	I(0)
UNE	*1st difference: None*	0.0000	I(1)
DEB	*Level: Intercept*	0.0066	I(0)

Table 5.4. Phillips-Perron test results

Variable	Phillips-Perron test	P-value	Order of Integration
HD	*1st difference: None*	0.0105	I(1)
INT	*1st difference: None*	0.0000	I(1)
INFL	*Level: Intercept*	0.0469	I(0)
GDP	*Level: None*	0.0194	I(0)
CON	*Level: Intercept*	0.0005	I(0)
UNE	*1st difference: None*	0.0000	I(1)
DEB	*1st difference: None*	0.0005	I(1)

5.5. Diagnostic tests

5.5.1. Pairwise correlation matrix

Pairwise correlation is done to show the relationship of variables, it uncovers the potential relation of interest. The higher the absolute value is of the correlation coefficient, the stronger is this relationship. The positive correlation coefficient means one variable rises as the other rises. A negative coefficient means one variable increases while the other decreases. A correlation around 0 indicates little to no linear relationship between variables. The results indicate that each variable has a positive and strong relationship on itself. INT and CPI have a negative correlation with HD.

Table 5.5. Pairwise correlation matrix

	HD	**INT**	**CPI**	**GDP**	**CON**	**UNE**	**DEB**
HD	1	-0.778	-0.406	0.055	-0.399	0.314	0.334
INT	-0.778	1	0.658	-0.185	0.288	-0.337	0.214
CPI	-0.406	0.658	1	-0.327	-0.004	-0.292	0.391
GDP	0.055	-0.185	-0.327	1	0.595	-0.333	-0.204
CON	-0.399	0.288	-0.005	0.595	1	-0.051	-0.307
UNE	0.314	-0.337	-0.291	-0.333	-0.051	1	-0.090
DEB	0.334	0.214	0.391	-0.204	-0.307	-0.090	1

5.5.2. Multicollinearity

Multicollinearity determines the relationship between independent variables. It is analyzed using the centered VIF values shown in table 5.6, it should not be greater than 5 to indicate that there is no severe multicollinearity. It has been proven by the centered VIF values that the is no severe multicollinearity between the dependent variables used to explain the household indebtedness.

Table 5.6. Multicollinearity results

VARIABLE	**CENTERED VIF**
INT	2.9455
CPI	2.2893
GDP	3.8488
CON	3.4907
UNE	2.1064
DEB	1.4472

The results indicated that there is no multicollinearity between the variables. The absence of multicollinearity shows that there is no relationship among the independent variables, they are uncorrelated.

5.5.3. Residual & coefficient diagnostic tests

Table 5.7. Residual-based diagnostic test results

Diagnosis & null hypothesis	Tests	P-value	Inference
Heteroscedasticity *Residuals are homoscedastic*	ARCH tests	0.9242	Do not reject the null hypothesis
Serial correlation *Residuals are serially uncorrelated*	Breusch-Godfrey LM test	0.7460	Do not reject the null hypothesis
Normality *Residuals are normally distributed*	Jarque-Bera test	0.7067	Do not reject the null hypothesis

After running the diagnosis tests, using the ARCH test for heteroscedasticity the residuals resulted to be homoscedastic, hence failed to reject the null hypothesis. Serial correlation results using the Breusch-Godfrey LM test, the null hypothesis was accepted as it indicated that the residuals are serially uncorrelated. The study failed to reject the null hypothesis as the normality test proved the residuals to be normally distributed using the Jarque-Bera test.

5.5.4. Stability tests

The study applies the CUSUM test to assess the stability of the model. The model is stable as the CUSUM plot lies between the 5% significance boundary lines.
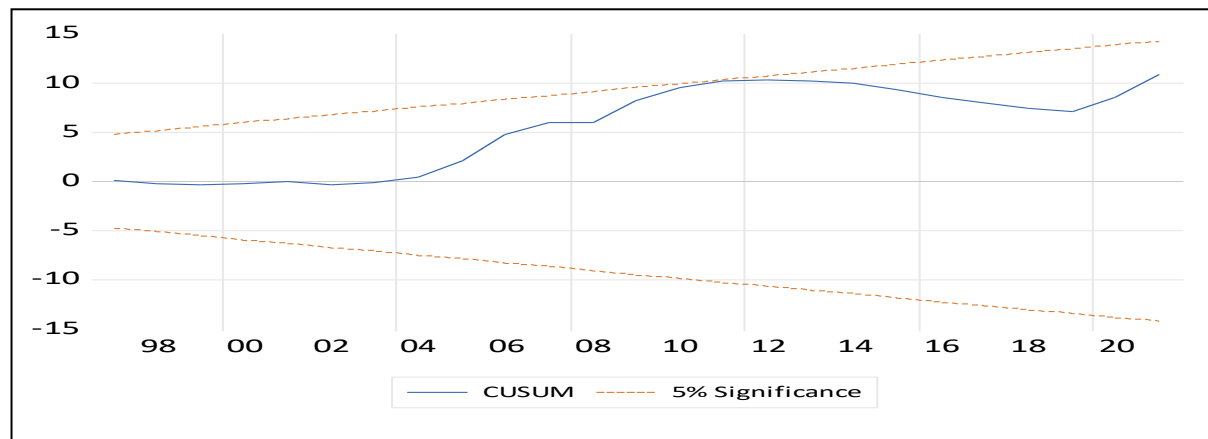
(*Figure 5.4.4*)

5.6. Estimation and Interpretation of Results

5.6.1. Lag length selection

The results from the VAR indicated that the Akaike information criterion's value is less than the Schwarz criterion value. The lag-length selection is determined based on the AIC value. The results shown below indicates that the optimal lag length is 2 as indicated by the asterisk sign.

Table 5.8. Lag length selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-105.6316	N/A	91.4740	7.3539	7.4011	7.3687
1	-73.3224	60.1620	10.5591	5.1946	5.2889	5.2241
2	-62.4861	19.4306*	5.3609*	4.5163*	4.6577*	4.5606*
3	-61.7445	1.2786	5.4629	4.5341	4.7227	4.5932

5.7. Discussion of Results

5.7.1 Autoregressive distributed lag (ARDL)

The stationarity test results indicated that the model is stationary at levels and first order, resulting in the ARDL model being used in this study.

Table 5.9. ARDL Bounds testing for cointegration

F-statistics (5.6391)

SIGNIFICANCE	I(0)	I(1)
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

The F-statistics is greater than the critical value for the upper bound I(1) at 5% significant, it is then concluded that there is no cointegration between the independent variables, therefore, reject the null hypothesis. It is concluded that there is a long-run relationship between the independent and the dependent variables,

Table 5.10. ARDL- short run results

VARIABLE	COEFFICIENT	P-VALUE
HD(-1)	1.4302***	0.0000
HD(-2)	-0.6075**	0.0012
INT	-0.1137	0.7796
CPI	-0.8277**	0.0024
CPI(-1)	0.1458	0.5223
CPI(-2)	-0.4411**	0.0456
GDP	-0.2489	0.4465
GDP(-1)	-0.3969	0.2523

GDP(-2)	-1.1748**	0.0132
CON	-0.5141*	0.0855
UNE	0.0624	0.9012
UNE(-1)	-1.4498**	0.0538
DEB	1.6276**	0.0300
DEB(-1)	-1.4991**	0.0379

***/ **/ * indicates significance at 1% ($p < 0.01$), 5% ($p < 0.05$) and 10% ($p < 0.10$) respectively.

- *Lags of household debt*

The ARDL model shows that household indebtedness at first and second year lags has a statistically significant impact on the household indebtedness of the current year. One year lagged household debt variable has a positive relationship with HD, however, two year lagged household variable has a negative impact on HD. Households continues to accumulate debts as they borrow more money to finance their previous debts.

- *Interest rates*

According to the short run results it is indicated that the interest rate has a negative insignificant impact on household. Emiris and Koulischer (2021) noted that households with greater housing wealth and fewer financial constraints are more likely to borrow when interest rates decrease. Their study showed that a household debt increase of 15% was significantly associated with a 1% decrease in interest rates. Their analysis corroborates the discovery that household debt increases in conjunction with low interest rates. Karambakuwa and Ncwadi (2021) discovered that high interest rates result in a decrease in income growth and a reduction in debtor cash flows, which could potentially affect the capacity to repay debts. This study found that the interest rate has a negative impact on household debt which is contrary to results of a study conducted by Werdaningtyas (2022), which revealed that there is a positive and significant relationship between interest rate and household indebtedness. The difference in finding may be due to a different use of estimation techniques and data time frame.

- *Inflation*

The current period inflation and the two-years lagged inflation are negative significant and significant at 1% and 5% respectively while the one-year lagged inflation is positive and

insignificant. A study conducted by Canakci (2021) demonstrated that inflation in China has a detrimental effect on household debt. In 2019, Son and Park conducted a quantitative analysis using a time-series model. The results indicated that household debt is positively influenced by per capita GDP and interest rates, but not to a significant extent by CPI. The results of Floden (2020) indicate that households with substantial debt in relation to their income are substantially more vulnerable to fluctuations in monetary policy than those with minimal or no debt. Azmin and Zaidi (2019) employed the OLS method and monthly time series data from 2012 to 2016 to determine a positive but insignificant correlation between household debt and inflation. Hongkil (2020) discovered a strong relationship between inflation and household debt, suggesting that the results were both significant and positive. The difference in results may be attributed to the use of a first-difference VAR approach and the incorporation of a different country.

- *GDP growth*

GDP and the one one-year lagged gross domestic product have negative and insignificant impact, whereas two-year lagged gross domestic product is negative but significantly influences household indebtedness. Using a panel of 43 nations, the study (Khairunnisa , et al., 2022) looked at the relationship between household debt and growth as well as the effect of institutional quality between 1984 and 2018. According to the findings, families are still necessary as a means of boosting consumption and total output, even while rising household debt hinders economic growth (Khairunnisa et al., 2022). Following an increase in domestic household debt, growth declines more sharply in nations whose household debt cycles are more closely aligned with the global household debt cycle.

- *Household consumption/expenditure*

Consumption is statistically significant and has a negative relationship to household indebtedness. South Africa's gross domestic product (GDP) development has been and continues to be primarily driven by consumption. Conversely, household debt has maintained its elevated level throughout the years. The well-being of an economy is reflected in these two economic indicators. Consequently, this investigation investigated the correlation between household debt and consumption expenditure during the years 1994–2013, the results of the study have demonstrated that a correlation exists between household debt and consumption spending in South Africa, and that this correlation extends from household debt to consumption expenditure. The implications of these findings are that consumption expenditure may be

increased through alternative methods rather than by increasing debt. A look at the household debt and consumption spending trends in South Africa shows that although household debt generally fluctuates more than consumption spending, periods with significant fluctuations in household debt also have noticeable fluctuations in consumption spending (Nkala & Tsegaye, 2017).

- *Unemployment*

The current period unemployment rate has no significant impact on the household indebtedness, while the one-year lagged unemployment rate has a negative and significant impact on household indebtedness at 10% level of significance. The results of a study done by Du Caju (2016) showed that the odds of being over indebted are much higher in households where the reference person is unemployed. They found that the percentage of households plagued by over-indebtedness increased by more than 10%, suggesting that another unemployment shock could have a major impact on the financial solvency of households. Looking at the data of South Africa and the results of the study it is safe to conclude that when unemployment is high South Africans households are impacted and be vulnerable to indebtedness. It is evident that unemployment results into household creating debts to sustain their livelihood, they are most likely to borrow money to repay other debts. The increase in household indebtedness is caused by an increase in unemployment rate (Lundbäck & Martinsson, 2016)

- *Debt cost*

The current period debt cost variable has a positive relationship with household indebtedness at 5% level of significance while the one-year lagged debt cost variable has a negative and significant impact at 5% level of significance, they are both statistically significant. Debt cost of previous years affects household indebtedness; households take other credits to cover the cost of the existing debts. Outstanding value of household debt is expected to rise further and as people borrow more to service past debt and also cover the surging costs of living (Yuvejwattana, 2023). Backer and Shabani, (2010) found that households with debts are less likely to have investments, as they are expected to repay their debts including the interest charged.

Table 5.11. ARDL- Long-run results

VARIABLE	COEFFICIENT	P-VALUE
INT	-0.6415	0.7283
CPI	-6.3349	0.2134
GDP	-10.2704	0.2130
CON	-2.9001	0.1559
UNE	-7.8266	0.2713
DEB	0.7245	0.8558
ECT	-0.1773***	0.0000

The F-bound test shows that critical value 5.3691 is greater than the lower-bound (2.27) and upper-bound (3.28) value at 5% significance. That leads to the conclusion that there is a long run equilibrium relationship between the dependent and independent variables. In the long run the results shows that all the independent variables are statistically insignificant. The error correlation term coefficient (-0.1773) suggest that almost 18% of the discrepancy between the long run and short is adjusted faster as the coefficient is closer to -1, and it is statistical significant.

5.7.2. Variance decomposition analysis of household debt

Table 5.12. Variance decomposition analysis

YEARS	HD	INT	CPI
1	100	0	0
2	94.2253	0.2309	0.0928
3	92.7512	2.4960	0.0524
4	83.5245	10.6067	0.0517
5	71.7231	22.3516	0.0796
6	64.9384	29.8495	0.0787

7	64.2058	30.2999	0.3069
8	62.8172	28.53621	1.4868
9	61.7576	26.5052	2.7521
10	60.9570	24.8854	3.52351

HD influences itself in the first year. In year 2 the changes in HD are largely from itself but diminishing as other variables are influencing it. In year 3, 2,5519% changes in HD are contributed by the interest rate and inflation. HD influences 83% of itself and the remaining percentage is an influence of the monetary policy impact. In year 4, interest rate and inflation contributes 10.6584% changes in HD. In the 5th year 22.429% changes to HD are influenced by the monetary policy. The monetary policy impacts the HD by 29.9281% in year 6. In year 7, the influence of HD to itself diminishes to 64.2058% due to the increase of influence from the monetary policy. HD influences 62.8172% of itself in year 8. Due to large impact of the monetary policy on HD, in year 9 the influence of HD to itself decreases to 61.7576%. The influence of HD to itself depreciates yearly given than the monetary policy's influence on HD increases every year. The results indicated that in year 10 the effect of HD to itself diminished to 60.9570% given than there was an increase to 28.4089% of interest rate and inflation effect on HD.

5.7.3. Impulse response functions
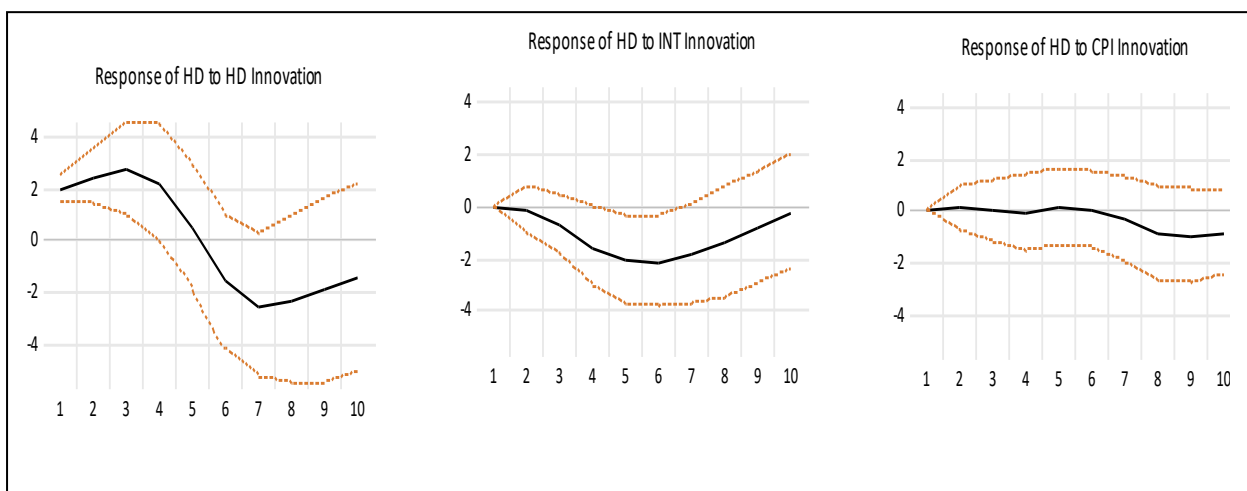
Figure 5.4.5

1st standard deviation shock given to HD by itself will results into an increase in HD in the first three years then become constant and start to decrease towards the 4th year and becomes negative. After year 7 HD gradually increases even though its response is still negative. 1st standard deviation innovation given to HD by INT will cause the HD to decrease from the first stage to year 5, and start to increase from the 5 year. HD will be in a stable state for 6 years given the 1st deviation shock on CPI, then start decreasing year 6. Given the results above, HD responds to shocks in the monetary policy.

5.8. Summary

The main objective was to discuss the monetary policy shocks on household indebtedness in South Africa. Based on the findings of this chapter, it can be concluded that monetary policy shocks influence household indebtedness. A pairwise correlation analysis was done to show the correlation between every single pair of variables. After running all the diagnostic tests, it is indicative the residuals are homoscedastic, they are serially uncorrelated and they are normally distributed. It is also indicative that there is no severe multicollinearity among the variables and that the model is stable as it lies between the 5% significance boundary lines. The results shows that the variables are stationary at I(0) and I(1) which resulted in the use of the ARDL model. From the results of the VAR a lag-length selection was conducted and the optimal lag-length was 2 due to the fact that the Akaike information was less than the Schwarz criterion. It is found that there is a negative relationship between the interest rate and household indebtedness during the years of study. Inflation has a negative impact on household indebtedness and is statistically significant. The results show that there is a negative impact between GDP, CON, UNE and household indebtedness, where as there is a positive impact between debt cost and the dependent variable. There is a long run equilibrium relationship between the dependent and independent variables. The R-square of 0.98 and R^2 of 0.97 indicate a better fit of the calculated regression equation, with the explanatory variables explaining 98 percent of the dependent variable. The probability F-statistics of 0.00 which is less than 0.05 means that the whole model is significant. The study used the AIC for lag-length selection as its value of 3.87 is less than the SIC value of 4.57. SARB implement monetary policy by using the interest rate and inflation to keep the economy stable, they use interest rate to fight inflation, while the results in this study indicated that there is no correlation between interest rate and inflation. Based on the results it is concluded that the monetary policy is not effective and needs to be revised.

CHAPTER 6: SUMMARY, KEY FINDINGS AND POLICY RECOMMENDATIONS

6.1 Introduction

This chapter concentrates on the conclusion that has been reached as a result of the study's findings. It also articulates the implications of the findings for South Africa household indebtedness and provides recommendations for future policy formulation. This chapter also addresses the future policies that will restrict the persistent rise in household debt in South Africa. A summary is compiled to address the contribution of the study to the existing body of literature.

6.2. Key findings

The aim of the study was to examine the monetary policy and household indebtedness in South Africa. In order for monetary policy to have a meaningful impact, it is crucial that any adjustments made to the official interest rate are promptly reflected in other interest rates. Additionally, the size of the change must be significant enough to affect overall demand in some way (Meshach & Magdalene, 2013). From 2010 to 2019, the South African interest rate saw a gradual increase, going from 6.4 percent to 7.0%. As a result, there was a noticeable decline in household debt, which went down from 72% in 2010 to 62.2% in 2022. Over the years, inflation experienced fluctuations, but it began to decrease in 2020 when the interest rate was low and household indebtedness remained high. In South Africa, the financial system after the Covid-19 pandemic has seen a shift towards a more restrictive monetary policy. The South African Reserve Bank (SARB) has consistently raised the repo rate in order to address the issue of inflation that has been on the rise.

It has been discovered in this study that there exists an insignificant negative correlation between the interest rate and household indebtedness over the course of the study. According to the findings of this study inflation has a negatively significant effect on household indebtedness. The results are in line with those of Fagereng (2021) where it was observed that the decrease in interest rates and the reduction of liquidity constraints have led to a substantial rise in household debt. When interest rates increase, it is possible that income growth may slow down and the flow of funds from debtors to support repayment may weaken. This, in turn, could have a different impact on indebtedness, as indicated by debt-to-income ratios. Emiris and Koulischer (2021) observed that households with higher housing wealth and fewer financial limitations tend to borrow more when interest rates decrease. It has been observed that a decrease of 1% in interest rates is linked to a significant increase of 15% in household

debt. The significant level of household debt and the current low nominal interest rates present certain concerns. Their analysis supports the finding that low interest rates are correlated with increased household debt.

Canakci's (2021) study revealed that inflation and interest rates have a negative impact on household debt in China. Household debt interest rates in South Africa are predicted to have a negative effect on household debt, while inflation is predicted to have a positive effect. This outcome from China could be attributed to the usage of additional household debt-driven factors. Karambakuwa and Ncwadi (2021) found that increased interest rates lead to a decrease in income growth and a reduction in debtor cash flows, potentially impacting the ability to repay debts. Households encounter significant difficulties in effectively managing their finances, safeguarding themselves against exploitative lending practices, and obtaining crucial credit-related information. Son and Park's (2019) quantitative analysis, employing a time-series model, revealed that household debt is positively influenced by per capita GDP and interest rates, but not to a significant degree by CPI. The relationship between household debt and an increase in income is more reliant on short-term variables than long-term variables. Additionally, the effect of interest rate fluctuations on household debt is less than income over the short term. According to the findings of Floden (2020), households with significant debt in relation to their income are significantly more responsive to fluctuations in the monetary policy interest rate than households with minimal or no debt

In contrast the estimation results of Werdaningtyas (2022) using OLS and ARDL results showed that the rise in household debt is impacted by factors such as income, age, and interest rates. According to the study, there is a positive and significant relationship between interest rate, unemployment rate, and consumption with household debt. Azmin and Zaidi (2019) using the OLS method show a positive but insignificant relationship between inflation and household debt, they used monthly time series data from 2012 to 2016. Hongkil (2020) found a strong correlation between household debt and inflation, indicating positive and significant results. The difference in results may be due to the application of a first-difference VAR approach and the inclusion of data from another country. (Mamatzakis, et al., 2022) found that household debt was positively correlated with monetary policy. This means any shift in the monetary policy has an impact on household debt.

6.3. Policy recommendations

It would be beneficial for the citizens if the inflation rate decreases, relieving them of the burden of household debt. To achieve this goal, individuals should be encouraged to develop a carefully planned strategy for managing their household debt, taking into account their income and bank records. Furthermore, it is important to consider the regional categorization of household debt, as there is a notable disparity in rates between urban and rural areas. It would be beneficial to implement a policy where the household debt is divided among all earning members of the house. This will foster a sense of responsibility at the individual level, as each earning member of the household contributes to repaying the debt. Based on the findings of this study, it is evident that there is a need for the monetary policy to reassess its current approach to maintaining the target interest rate. It may be beneficial to consider a more accommodating approach. In accordance with previous research, this study suggests that the country should engage in cautious forecasting to inform policy decisions and potential adjustments. It is important for policymakers to take into account the potential impact of maintaining a high interest rate. While this may result in lower household debts, the intended increase in investment has been hindered by high unemployment rates. From an economic perspective, it is evident that households are increasingly burdened by debt as they borrow money for consumption in the face of high inflation. Unfortunately, the ability to repay these debts is severely limited or nonexistent. Also recommend a review of interest rates on debt and availability of consumption insurance on all loans to cover for cases when the household faces unforeseen circumstances affecting repayment. Government should ensure that all financial institutions operating in the retail credit market adhere to the highest market conduct standards and do not encourage consumers to incur unsustainable debt. The study suggest that households undergo upskilling in order to more effectively manage their finances and assume responsibility. Moneylending institutions are encouraged to disclose critical information regarding credit that influences households' borrowing decisions and to prevent predatory lending. Additionally, suggests that the household review the interest rates on debt and the availability of consumption insurance on all loans to account for unforeseen circumstances that may impact repayment.

It is also advisable for policymakers to develop policies that will minimize the various components of household debt. At the discretion of the policymakers, households that previously valued purchasing on accounts and instalments will be compelled to reduce their consumption of these activities. Households could be encouraged to establish asset savings

accounts that generate interest in order to purchase their assets with these funds and refrain from engaging in other financial activities that will worsen their debt. It would also be beneficial for policymakers to increase the income of households by creating employment and utilizing more investment opportunities. This income can be used to increase household consumption, rather than relying on debt.

6.4. Limitation and suggestion for future studies

The aim of the study is to investigate the impact of monetary policy shocks on household indebtedness in South Africa. The main goal of the South African Reserve Bank is to safeguard the currency's value in order to promote balanced and sustainable economic growth in the Republic. With the goal of protecting the value of the rand, the South African Reserve Bank utilizes interest rates as a tool to combat inflation. Based on the data from 1990 to 2022, the results suggest that there is no correlation between the interest rate and inflation. The results were surprising and spanned from 1990 to 2022 without any constraints. This raises concerns about how the SARB is implementing monetary policy. Further research should be conducted to analyze the implementation of monetary policy by the SARB and its effects on the South African economy. In the South African context, despite the high interest rates and rising inflation, household debts continue to increase, which goes against the expectations based on literature and study results.

7. REFERENCES

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8. APPENDIX

8.1. OLS

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Dependent Variable: HD
Method: Least Squares
Date: 11/11/23   Time: 08:16
Sample: 1990 2021
Included observations: 32
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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	49.33526	13.86045	3.559426	0.0015
INT	-2.635493	0.386165	-6.824790	0.0000
CPI	-0.088804	0.309329	-0.287086	0.7764
GDP	0.129923	0.547635	0.237244	0.8144
CON01	-0.038677	0.494372	-0.078234	0.9383
UNE	0.436616	0.550531	0.793082	0.4352
DEB	3.552197	0.569368	6.238838	0.0000

R-squared	0.872894	Mean dependent var	59.68750
Adjusted R-squared	0.842389	S.D. dependent var	9.863774
S.E. of regression	3.915947	Akaike info criterion	5.758631
Sum squared resid	383.3660	Schwarz criterion	6.079261
Log likelihood	-85.13810	Hannan-Quinn criter.	5.864911
F-statistic	28.61440	Durbin-Watson stat	0.912129
Prob(F-statistic)	0.000000		

8.2. HETEROSKEDASTICITY- ARCH TEST

```
Heteroskedasticity Test: ARCH
```

F-statistic	1.751308	Prob. F(1,29)	0.1961
Obs*R-squared	1.765471	Prob. Chi-Square(1)	0.1839

```
Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/11/23   Time: 08:18
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.158785	3.600027	2.544088	0.0165
RESID^2(-1)	0.242827	0.183491	1.323370	0.1961

R-squared	0.056951	Mean dependent var	11.93888
Adjusted R-squared	0.024432	S.D. dependent var	16.48002
S.E. of regression	16.27746	Akaike info criterion	8.479780
Sum squared resid	7683.713	Schwarz criterion	8.572296
Log likelihood	-129.4366	Hannan-Quinn criter.	8.509938
F-statistic	1.751308	Durbin-Watson stat	1.858794
Prob(F-statistic)	0.196052		

8.3. SERIAL CORRELATION

```
Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags
```

F-statistic	13.00767	Prob. F(2,23)	0.0002
Obs*R-squared	16.98430	Prob. Chi-Square(2)	0.0002

```
Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 11/11/23   Time: 08:19
Sample: 1990 2021
Included observations: 32
Presample missing value lagged residuals set to zero.
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.99402	11.00208	1.908187	0.0689
INT	0.217672	0.291061	0.747857	0.4621
CPI	-0.618154	0.303743	-2.035123	0.0535
GDP	-0.834065	0.430640	-1.936802	0.0651
CON01	0.000228	0.363637	0.000626	0.9995
UNE	-0.671175	0.414834	-1.617937	0.1193
DEB	-0.358722	0.480951	-0.745860	0.4633
RESID(-1)	1.075704	0.211047	5.096980	0.0000
RESID(-2)	-0.288027	0.272216	-1.058083	0.3010

8.4. CORRECTING SERIAL CORRELATION

1Lag of HD

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	40.40740	Prob. F(1,22)	0.0000
Obs*R-squared	20.07181	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 11/14/23   Time: 14:40
Sample: 1991 2021
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.51418	6.963364	1.509928	0.1453
INT	-0.002199	0.274699	-0.008005	0.9937
CPI	-0.224021	0.143736	-1.558561	0.1334
GDP	-0.011714	0.254548	-0.046018	0.9637
CON01	-0.429581	0.235872	-1.821246	0.0822
UNE	0.163222	0.283885	0.574959	0.5712
DEB	-0.451953	0.424852	-1.063788	0.2990
HD(-1)	-0.109467	0.087100	-1.256791	0.2220
RESID(-1)	1.051602	0.165432	6.356681	0.0000

R-squared	0.647478	Mean dependent var	-2.41E-15
Adjusted R-squared	0.519288	S.D. dependent var	2.457423
S.E. of regression	1.703815	Akaike info criterion	4.141318
Sum squared resid	63.86571	Schwarz criterion	4.557637
Log likelihood	-55.19042	Hannan-Quinn criter.	4.277027
F-statistic	5.050925	Durbin-Watson stat	1.875378
Prob(F-statistic)	0.001185		

R-squared	0.019535	Mean dependent var	6.62E-15
Adjusted R-squared	-0.496499	S.D. dependent var	1.500260
S.E. of regression	1.835290	Akaike info criterion	4.328857
Sum squared resid	63.99752	Schwarz criterion	4.842630
Log likelihood	-53.93286	Hannan-Quinn criter.	4.493218
F-statistic	0.037857	Durbin-Watson stat	1.970205
Prob(F-statistic)	0.999996		

8.5. NORMALITY TEST

Series: Residuals	
Sample 1990 2021	
Observations 32	
Mean	1.62e
Median	-0.0695
Maximum	5.4675
Minimum	-9.1373
Std. Dev.	3.5166
Skewness	-0.3426
Kurtosis	2.7743
Jarque-Bera	0.6941
Probability	0.7067
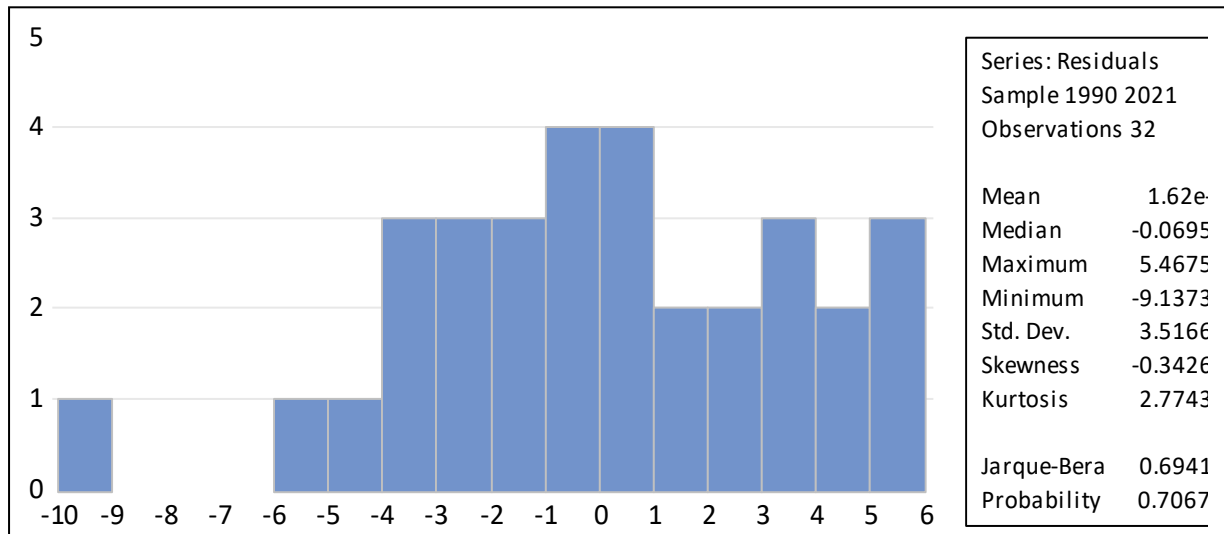
8.6. MULTICOLLINEARITY

Variance Inflation Factors
Date: 11/11/23   Time: 08:21
Sample: 1990 2021
Included observations: 32

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	192.1122	400.8957	NA
INT	0.149123	41.47497	2.945555
CPI	0.095684	11.10773	2.289286
GDP	0.299904	6.479554	3.848818
CON01	0.244404	15.10139	3.490748
UNE	0.303084	293.4466	2.106421
DEB	0.324180	52.35717	1.447272

8.7. STABILITY TEST
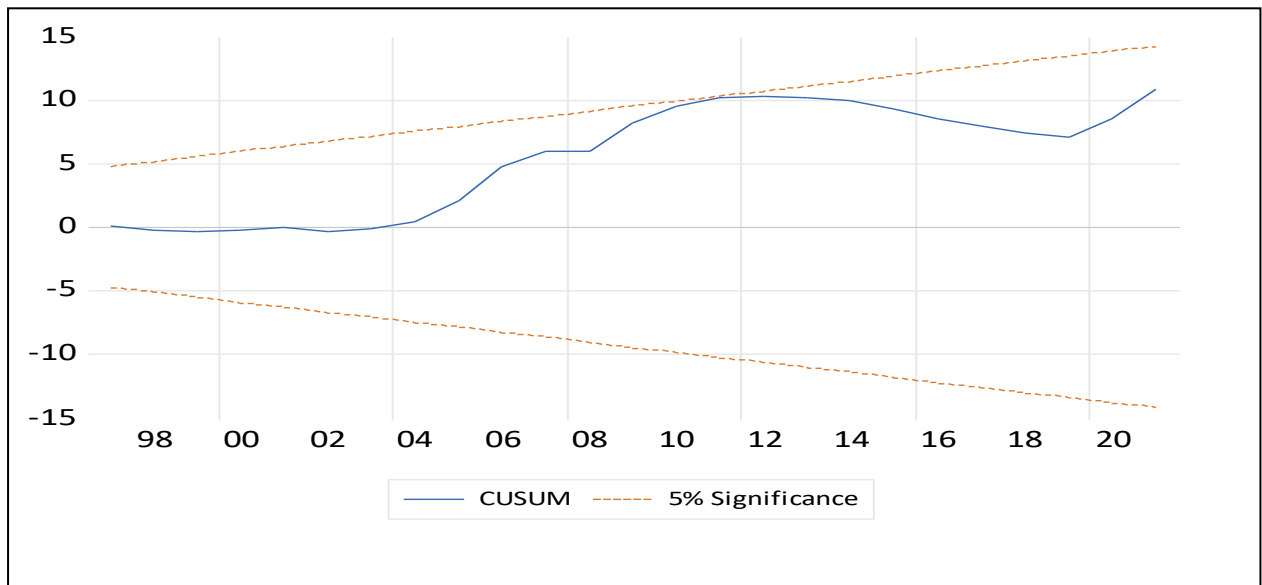
8.8. ROBUST OF LEAST SQUARE

Dependent Variable: HD
Method: Robust Least Squares
Date: 04/04/25   Time: 22:19
Sample: 1990 2021
Included observations: 32
Method: M-estimation
M settings: weight=Bisquare, tuning=4.685, scale=MAD (median
    centered)
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	52.56771	14.34053	3.665674	0.0002
INT	-2.679449	0.399540	-6.706334	0.0000
CPI	-0.050894	0.320043	-0.159023	0.8737
GDP	0.143400	0.566604	0.253087	0.8002
CON01	-0.048543	0.511496	-0.094905	0.9244
UNE	0.335562	0.569599	0.589119	0.5558
DEB	3.468959	0.589089	5.888680	0.0000

Robust Statistics			
R-squared	0.818845	Adjusted R-squared	0.775368
Rw-squared	0.888959	Adjust Rw-squared	0.888959
Akaike info criterion	29.30210	Schwarz criterion	45.09049
Deviance	349.1244	Scale	4.093944
Rn-squared statistic	159.2268	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics			
Mean dependent var	59.68750	S.D. dependent var	9.863774
S.E. of regression	3.925856	Sum squared resid	385.3087

8.9. UNIT ROOT

A) AUGUMENTED-DICKEY FULLER TEST

VARIABLES	LEVEL	P-VALUE (ADF)	P-VALUE (PP)	STATIONARY AT:
HD	Level: None	0.7497	0.0840	I(1)
	Intercepts	0.2182	0.4935	
	Trends	0.2269	0.7637	
	1st difference none	0.0049	0.0105	
INT	Level: None	0.0788	0.0788	I(1)
	Intercepts	0.4725	0.4737	
	Trends	0.9628	0.9628	
	1st difference none	0.0029	0.0000	
CPI	Level: None	0.0227	0.0458	I(0)
	Intercepts	0.0120	0.0469	
	Trends			
	1ST difference			
GDP	Level: None	0.0128	0.0194	I(0)
	Intercepts			
	Trends			
	1st difference			
CON	Level: None	0.4469	0.3860	I(0)
	Intercepts	0.0006	0.0005	
	Trends			
	1st difference			
UNE	Level: None	0.9597	0.9794	I(1)

	Intercepts	0.9826	0.8730	
	Trends	0.7387	0.7889	
	1st difference	0.0000	0.0000	
DEB	Level: None	0.5075	0.4838	I(0)
	Intercepts	0.0066	0.2405	
	Trends		0.5834	
	1st difference		0.0005	

B) PHILLIPS-PERRON TEST

VARIABLES	LEVEL	P-VALUE	STATIONARY AT:
HD	Level: None	0.7497	I(1)
	Intercepts	0.2182	
	Trends	0.2269	
	1st difference	0.0049	
INT	Level: None	0.0788	I(1)
	Intercepts	0.4725	
	Trends	0.9628	
	1st difference	0.0029	
CPI	Level: None	0.0227	I(0)
	Intercepts	0.0120	
	Trends		
	1ST difference		
GDP	Level: None	0.0128	I(0)
	Intercepts		
	Trends		

	1st difference		
CON	Level: None	0.4469	I(0)
	Intercepts	0.0006	
	Trends		
	1st difference		
UNE	Level: None	0.9597	I(1)
	Intercepts	0.9826	
	Trends	0.7387	
	1st difference	0.0000	
DEB	Level: None	0.5075	I(0)
	Intercepts	0.0066	
	Trends		
	1st difference		

8.10. LAG-LENGTH CRITERIA

VAR Lag Order Selection Criteria
Endogenous variables: HD
Exogenous variables: C
Date: 11/13/24   Time: 21:12
Sample: 1990 2021
Included observations: 29

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-105.6316	NA	91.47409	7.353905	7.401054	7.368672
1	-73.32241	60.16200	10.55913	5.194649	5.288945	5.224181
2	-62.48610	19.43063*	5.360988*	4.516283*	4.657727*	4.560581*
3	-61.74452	1.278588	5.462995	4.534105	4.722697	4.593169

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

8.11. VAR

```
Vector Autoregression Estimates
Date: 11/11/23   Time: 08:41
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments
Standard errors in ( ) & t-statistics in [ ]
```

	HD
HD(-1)	1.588931
	(0.13932)
	[11.4046]
HD(-2)	-0.683842
	(0.13619)
	[-5.02123]
C	5.788670
	(2.64200)
	[2.19102]
R-squared	0.946546
Adj. R-squared	0.942587
Sum sq. resids	143.5220
S.E. equation	2.305565
F-statistic	239.0553
Log likelihood	-66.04752
Akaike AIC	4.603168
Schwarz SC	4.743288
Mean dependent	60.51667
S.D. dependent	9.622140

8.12. ARDL COINTERGRATION BOUND TEST

A) ARDL

Dependent Variable: HD
Method: ARDL
Date: 11/11/23   Time: 08:47
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): INT CPI GDP CON01 UNE DEB
Fixed regressors: C
Number of models evaluated: 1458
Selected Model: ARDL(2, 0, 2, 2, 0, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
HD(-1)	1.430189	0.162861	8.781676	0.0000
HD(-2)	-0.607461	0.152427	-3.985261	0.0012
INT	-0.113735	0.399097	-0.284981	0.7796
CPI	-0.827660	0.227652	-3.635636	0.0024
CPI(-1)	0.145786	0.222505	0.655202	0.5223
CPI(-2)	-0.441138	0.202354	-2.180034	0.0456
GDP	-0.248923	0.318433	-0.781713	0.4465
GDP(-1)	-0.396986	0.333445	-1.190557	0.2523
GDP(-2)	-1.174751	0.418002	-2.810395	0.0132
CON01	-0.514099	0.279303	-1.840651	0.0855
UNE	0.062444	0.494321	0.126324	0.9012
UNE(-1)	-1.449882	0.692834	-2.092683	0.0538
DEB	1.627581	0.678830	2.397628	0.0300
DEB(-1)	-1.499149	0.658340	-2.277164	0.0379
C	54.27052	15.86822	3.420076	0.0038

R-squared	0.988489	Mean dependent var	60.51667
Adjusted R-squared	0.977745	S.D. dependent var	9.622140
S.E. of regression	1.435428	Akaike info criterion	3.867656
Sum squared resid	30.90681	Schwarz criterion	4.568255
Log likelihood	-43.01484	Hannan-Quinn criter.	4.091784
F-statistic	92.00728	Durbin-Watson stat	1.832060
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model
    selection.

B) LONG-RUN

```
ARDL Long Run Form and Bounds Test
Dependent Variable: D(HD)
Selected Model: ARDL(2, 0, 2, 2, 0, 1, 1)
Case 2: Restricted Constant and No Trend
Date: 11/11/23   Time: 08:53
Sample: 1990 2021
Included observations: 30
```

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	54.27052	15.86822	3.420076	0.0038
HD(-1)*	-0.177273	0.139091	-1.274507	0.2219
INT**	-0.113735	0.399097	-0.284981	0.7796
CPI(-1)	-1.123013	0.308493	-3.640315	0.0024
GDP(-1)	-1.820660	0.678011	-2.685293	0.0170
CON01**	-0.514099	0.279303	-1.840651	0.0855
UNE(-1)	-1.387437	0.554698	-2.501248	0.0244
DEB(-1)	0.128432	0.786582	0.163278	0.8725
D(HD(-1))	0.607461	0.152427	3.985261	0.0012
D(CPI)	-0.827660	0.227652	-3.635636	0.0024
D(CPI(-1))	0.441138	0.202354	2.180034	0.0456
D(GDP)	-0.248923	0.318433	-0.781713	0.4465
D(GDP(-1))	1.174751	0.418002	2.810395	0.0132
D(UNE)	0.062444	0.494321	0.126324	0.9012
D(DEB)	1.627581	0.678830	2.397628	0.0300

```
 * p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).
```

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-0.641585	1.812918	-0.353896	0.7283
CPI	-6.334952	4.874770	-1.299539	0.2134
GDP	-10.27040	7.895593	-1.300776	0.2130
CON01	-2.900051	1.941239	-1.493917	0.1559
UNE	-7.826578	6.852936	-1.142077	0.2713
DEB	0.724488	3.913782	0.185112	0.8556
C	306.1418	212.6411	1.439711	0.1705

EC = HD - (-0.6416*INT -6.3350*CPI -10.2704*GDP -2.9001*CON01 -7.8266
    *UNE + 0.7245*DEB + 306.1418)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.369118	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	30		Finite Sample: n=30	
		10%	2.334	3.515
		5%	2.794	4.148
		1%	3.976	5.691

8.13. ERROR CORRECTION MODEL

```
ARDL Error Correction Regression
Dependent Variable: D(HH)
Selected Model: ARDL(2, 0, 2, 2, 0, 1, 1)
Case 2: Restricted Constant and No Trend
Date: 10/31/23   Time: 00:42
Sample: 1990 2021
Included observations: 30
```

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HH(-1))	0.607461	0.091599	6.631775	0.0000
D(INF)	-0.827660	0.130538	-6.340379	0.0000
D(INF(-1))	0.441138	0.140272	3.144887	0.0067
D(GDP)	-0.248923	0.097337	-2.557325	0.0219
D(GDP(-1))	1.174751	0.196311	5.984146	0.0000
D(UNE)	0.062444	0.359070	0.173906	0.8643
D(DEC)	1.627581	0.343895	4.732780	0.0003
CointEq(-1)*	-0.177273	0.022335	-7.937106	0.0000

R-squared	0.894779	Mean dependent var	0.543333
Adjusted R-squared	0.861300	S.D. dependent var	3.182569
S.E. of regression	1.185266	Akaike info criterion	3.400990
Sum squared resid	30.90681	Schwarz criterion	3.774642
Log likelihood	-43.01484	Hannan-Quinn criter.	3.520524
Durbin-Watson stat	1.832060		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.369118	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

8.14. IMPULSE RESPONSE

Response to Cholesky One S.D. (d.f. adjusted) Innovations
±2 analytic asymptotic S.E.s
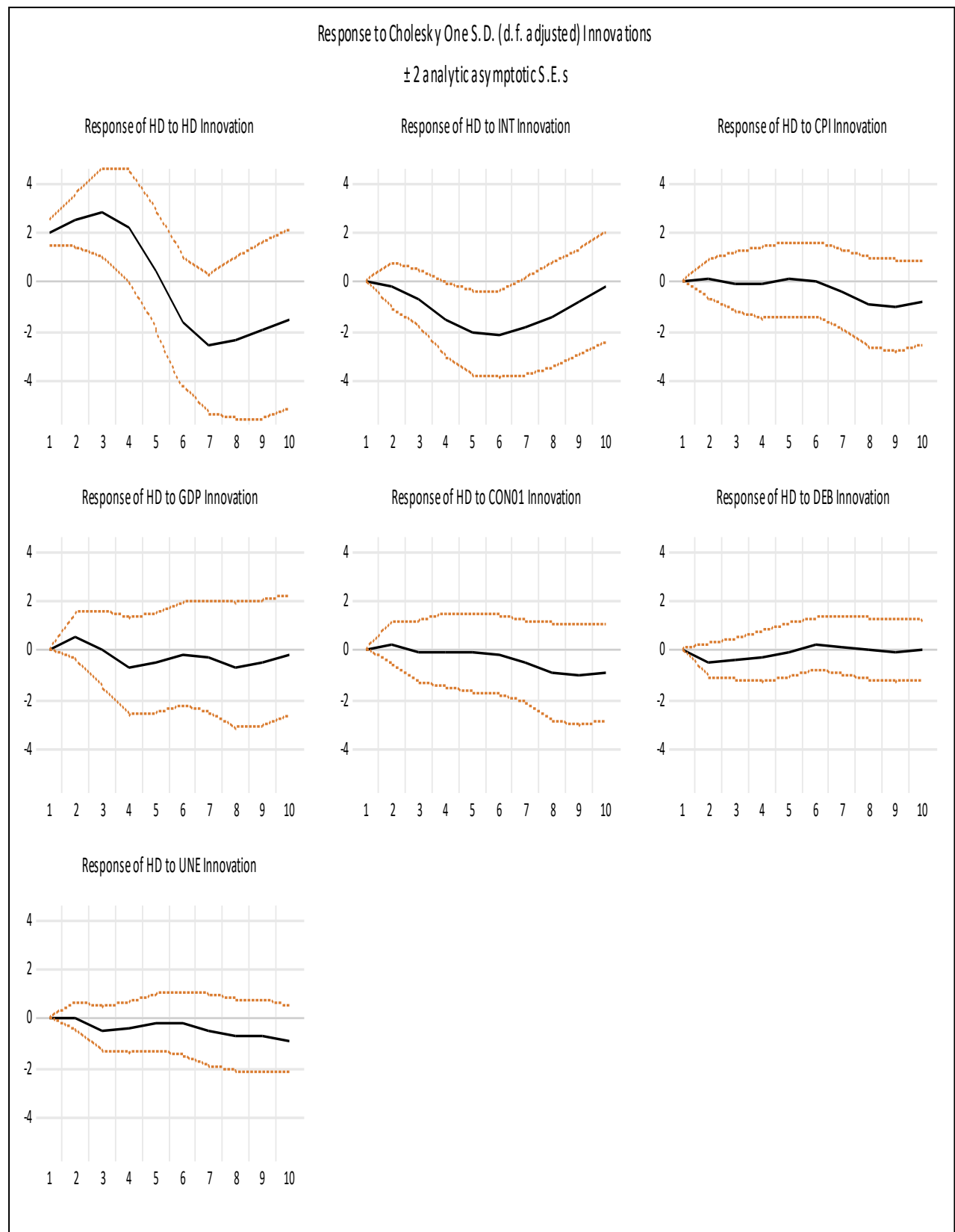
8.15. VARIANCE DECOMPOSITION

Variance Decomposition of HD:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	1.984447	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000
2	3.271924	94.22536	0.230928	0.092838	2.901395	0.847832	0.008263	1.69338
3	4.403912	92.75118	2.496038	0.052356	1.613844	0.481883	1.127187	1.47750
4	5.227318	83.52450	10.60665	0.051727	2.765464	0.342799	1.424786	1.28407
5	5.665728	71.72308	22.35161	0.079578	3.148402	0.328725	1.275560	1.09304
6	6.272479	64.93842	29.84945	0.078652	2.625289	0.370782	1.092557	1.04485
7	7.053077	64.20584	30.29998	0.306984	2.233541	0.760544	1.258339	0.93477
8	7.702671	62.81720	28.53621	1.486796	2.540033	1.964196	1.845322	0.81024
9	8.152712	61.75764	26.50515	2.752051	2.666194	3.164812	2.423238	0.73091
10	8.423569	60.95701	24.88542	3.523507	2.542692	4.087326	3.303559	0.70047

Variance Decomposition of INT:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	0.831987	0.787086	99.21291	0.000000	0.000000	0.000000	0.000000	0.00000
2	1.141005	3.207231	87.19008	0.317311	5.601799	0.006367	1.402204	2.27500
3	1.441832	3.180388	77.52344	2.040149	10.73143	2.804117	2.252440	1.46803
4	1.686019	11.89651	71.28670	2.244140	9.485201	2.061941	1.907960	1.11754
5	1.856300	19.98059	63.45192	2.083521	7.866689	2.512815	2.966194	1.13827
6	1.979505	19.92407	57.93641	3.483126	8.076233	4.127872	5.390786	1.06150
7	2.064954	18.72602	54.07920	5.337239	7.948004	5.903940	7.022503	0.98309
8	2.140457	17.54202	50.56599	6.567736	7.524670	7.790573	9.093557	0.91546
9	2.207101	16.54763	47.60600	7.248660	7.192683	8.961918	11.56953	0.87357
10	2.288672	15.47968	44.27547	7.918970	7.121706	10.37572	14.00751	0.82094

Variance Decomposition of CPI:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	1.256731	6.191430	3.361067	90.44750	0.000000	0.000000	0.000000	0.00000
2	1.342328	6.193007	9.857609	79.42235	4.280541	0.183933	0.059496	0.00030
3	2.089744	16.96437	4.805481	40.17763	12.92385	9.071693	0.559032	15.4979
4	2.766821	39.51850	2.914071	22.92205	17.81291	6.239555	1.201076	9.39183
5	3.105102	40.53685	2.781317	21.76152	17.44054	7.714734	1.740984	8.02406
6	3.479145	34.14533	2.256647	23.87919	18.00462	9.608391	4.914727	7.19109
7	3.597926	34.27182	2.138432	23.04799	19.46100	9.334661	4.903399	6.84269
8	3.620917	33.92521	2.212987	23.29036	19.52252	9.222603	4.847370	6.97895
9	3.665882	33.34020	2.776464	22.94313	19.83187	9.024255	5.118268	6.96582
10	3.772934	34.05490	3.018886	22.24408	19.12388	8.900350	6.019733	6.63817

Variance Decomposition of GDP:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	1.553549	20.98542	6.777718	1.457264	70.77960	0.000000	0.000000	0.00000
2	2.509526	24.68375	2.709295	11.64636	36.78376	8.166766	15.06992	0.94015
3	2.649013	26.08262	3.434175	11.11146	36.20534	8.661007	13.62975	0.87565
4	2.756882	28.84792	3.503478	10.63859	34.35593	8.700915	12.63432	1.31885
5	3.191296	40.67265	2.820665	8.240772	30.64681	6.500167	9.554081	1.56485
6	3.359909	36.75575	3.208915	9.753000	29.03242	7.718047	12.06278	1.46909
7	3.535589	35.23975	3.059042	11.38764	28.77161	8.559599	11.48167	1.50069
8	3.545250	35.09496	3.320681	11.36067	28.67833	8.627992	11.42456	1.49281
9	3.633298	34.95868	4.332254	11.15955	28.52666	8.234366	11.09581	1.69267
10	3.697572	34.31968	5.558879	10.88776	27.68988	8.185869	11.71282	1.64511

Variance Decomposition of CON01:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	1.739819	42.13071	1.398517	1.481401	15.09900	39.89037	0.000000	0.00000
2	2.745085	41.50677	1.030472	2.042850	27.91068	19.72156	7.766548	0.02111
3	2.853475	39.64845	1.571332	2.005031	26.18567	18.29746	11.68234	0.60970
4	3.557416	42.94510	1.135902	3.360440	29.56546	12.33286	10.06958	0.59066
5	3.841230	45.72807	2.338340	3.011452	28.61745	10.59431	8.963919	0.74645
6	4.143767	43.41009	2.368915	4.935812	29.51055	10.08176	8.704953	0.98791
7	4.238198	44.14566	2.273470	5.054904	28.77161	9.745709	8.864123	1.14562
8	4.383989	42.73188	2.299311	5.797983	29.35176	9.740167	8.941734	1.13716
9	4.456472	41.86626	2.921673	6.322276	29.09299	9.862437	8.695148	1.23921
10	4.586643	43.35702	2.988629	6.153216	28.58629	9.371114	8.311581	1.23215

Variance Decomposition of UNE:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	0.602708	2.946932	1.219090	0.784377	15.43831	15.13002	64.48127	0.00000
2	0.718507	6.758467	4.543893	0.553159	10.86308	11.67297	64.28505	1.32337
3	1.310057	22.10548	2.139751	7.437706	21.97728	11.12904	34.45948	0.75125
4	1.334139	21.70702	2.101797	8.141998	21.51998	11.81732	33.88313	0.82875
5	1.405855	24.91776	2.586509	7.332621	20.14333	11.42430	32.42632	1.16915
6	1.506431	27.71600	4.165652	6.484555	17.80967	11.02064	30.99829	1.80518
7	1.606912	24.35828	5.573067	8.356104	17.16749	12.96163	29.99651	1.58691
8	1.653130	23.24470	7.377725	9.163727	16.22210	13.70800	28.78364	1.50009
9	1.705172	22.88738	10.29905	8.735987	15.58815	13.29678	27.73218	1.46047
10	1.756750	21.57625	14.09185	8.278590	14.70982	12.77750	27.10022	1.46577

Variance Decomposition of DEB:

Period	S.E.	HD	INT	CPI	GDP	CON01	UNE	DEB
1	0.769160	0.011863	31.03742	34.79516	6.712908	1.527399	0.328013	25.5872
2	1.109853	4.215528	33.83579	20.68890	24.55464	1.295871	1.817248	13.5920
3	1.457219	27.10247	28.25370	13.16800	19.45131	1.132834	1.245046	9.64664
4	1.818935	48.72921	18.48371	9.812113	13.01596	0.993169	1.463298	7.50253
5	1.957693	53.21272	16.88109	8.609469	12.46688	0.964971	1.287843	6.57703
6	2.024481	50.13367	17.55528	10.42247	11.82966	1.562701	2.029078	6.46714
7	2.135248	51.78039	16.82469	10.24746	11.19283	1.766652	2.135354	6.05261
8	2.184290	53.18126	16.63571	9.899358	10.75834	1.699027	2.042216	5.78408
9	2.216061	52.81515	16.56288	10.16533	11.00196	1.795458	1.995768	5.66345
10	2.239840	53.58865	16.29449	9.965580	10.76962	1.757663	2.078825	5.54516