TITLE: EXAMINING THE RELATIONSHIP BETWEEN HOUSEHOLD DEBT AND ECONOMIC PERFORMANCE IN SOUTH AFRICA.

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by

Stephen Karombe

Student No: 2629817

Email: 2629817@students.wits.ac.za

Supervisor: Dr Ismail Fasanya

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SUPERVISOR DECLARATION

I, Dr. Ismail Fasanya have seen and am satisfied that the final report of STEPHEN KAROMBE student number 2629817 be submitted for marking.

Supervisor's signature ________________________________

ABSTRACT

High level of debt has been a major concern in the South Africa recent times. The prevalence of high debt levels hinders savings and investments, thus exerting a detrimental influence on economic growth. This surge in debt can be attributed to the consumer boom experienced in the past decade and the recent proliferation of credit cards, which have made it easier for consumers to access goods and services. This study evaluates the link between household debt and economic performance and characterises the implications of changes in household debt on economic growth in South Africa using the Toda Yamamoto VAR framework, using quarterly data covering the period 2008Q1 to 2022Q2. The connection between household debt and economic growth lies in the Life Cycle Hypothesis. The following findings are discernible from the analysis. First, the study finds that there is a bi-directional relationship between economic growth and mortgage loans and a unidirectional relationship between economic growth and household debt to disposable income ratio. Second, household debt to disposable income has a significant impact on economic growth, whilst the debt service ratio insignificantly affects economic growth with a smaller margin. Third, economic growth responds positively to mortgage loans, while a positive response to household debt exists which is transitory and positive. These results suggest that policymakers should encourage economic agents to take mortgage loans to boost economic growth in the short run. Household debt may be used to boost the economy in the short run but may deter economic growth in the long run. In the meantime, nothing maybe be done in items of debt service ratio as it has no significant impact, however, constant monitoring may be applied to avoid creeping in of debt overhang in the future. Access to household debt should be monitored and controlled since high debt significantly impacts economic growth in the long run.

LIST OF ACRONYMS

AIC	Akaike's Information Criterion
ADF	Augmented Dickey-Fuller
Df	Degrees of freedom
DSR	Debt Service Ratio
EG	Economic Growth
ECM	Error Correction Model
GDP	Gross Domestic Product
FPE	Final Prediction Error
HD	Household debt to Disposable income
HQ	Hannan and Quinn
IRF	Impulse Response Function
KPSS	Kwiatkowski–Phillips–Schmidt–Shin
LCH	Life Cycle Hypothesis
NCA	National Credit Act
NCR	National Credit Regulator
OECD	Organization for Economic Cooperation and Development
PIH	Permanent Income Hypothesis
PP	Philip Perron
SARB	South African Reserve Bank
SIC	Schwarz's information criterion
TY	Toda Yamamoto
VAR	Vector Auto-Regressive
VDC	Variance Decomposition
VECM	Vector Error Correction Model

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CHAPTER ONE

INTRODUCTION

1.1 Background

The use of borrowing to fund current consumption has been around since the beginning of ages. Over time, complex financial systems have sprouted out as more people respond to the benefit of borrowing and lending. Almost every adult especially in developed economies has accessed debt at some point in their life (Drehmann, Illes, Juselius. & Santos, 2015). Debt can be defined as the funding of current consumption using future income (Albuquerque & Green, 2022).
With the dawn of the 21st century, globally we have seen increased access to loans by households. This can be explained by a couple of factors. Deregulation of financial markets has accounted for a bigger percentage of household debt (Karambakuwa & Ncwadi 2021). Those people who did not formerly qualify for loans marched with ease into the financial market pushing the household debt participation ratio high (Drehmann *et al*., 2015). Also worth noting is the use of credit cards, which has led many to access debt even when they did not need it. Some accessed debt while they did not fully understand the financial consequences.
According to Bosch, Clance and Koch (2021), some countries revealed that indebtedness was founded in the extreme credit booms in the years prior to the 2008 financial crisis. The indebtedness was then deepened by random and severe fluctuations in house prices (Lombard, Mohanty & Shim, 2017).
The ability of households to balance cash flows for the period of their life cycle is one of the long-acknowledged principal determining factor of forthcoming household spending and the growth of the economy. Regardless of reasonably exerting adverse influence on aggregate savings, in the present and near future household creates room for demand to surge. This increases the immediate output and the probable prospective economic growth. In the long term, over-leveraged households can act as an obstacle to consumption.

Conspicuously, the high rate of debt to income has an indisputable connection to the greater responsiveness of households to any change in expected income and interest rates (Lombard *et al*., 2017) The economic causes and the effects are based innately on the broader macroeconomic context and the composition and structure of the household debt, the relationship, and the depth of those relationships with the prevailing economic setup and conditions. Tolerating more borrowing will surge the cost of borrowing and therefore it worsens borrowers' terms of trade.

Overall, over the previous two decades, the debt situation of households has grown substantially, especially in more advanced economies where financial liberation is most dominant. Even developing economies have recorded a spike in debt (Samad, 2020). This growth has fuelled consumption growth and contributed to the inevitable decline of income saved by households. South Africa is not an exception, the economy encountered an increase in household indebtedness (National Credit Regulator (NCR), 2019). In South Africa, there has been an increase in debt obsession by households in the previous decade possibly fuelled by the consumer boom of the last decade. All forms of debt (that is, public, corporate, and household) have been gradually crawling up. Household debt which is the point of focus in this paper is no exception.

The 2008 Great Recession of the last decade has generated fresh interest and inquiries about the link between the debt that households own and the macro-economy. Experiential information revealed, that household debt explained more than 93 per cent of total debt in South Africa (NCR, 2019). This implies that households are living way outside their financial constraints. Beholding the effects of over-indebtedness, a reasonable concern looms especially considering the upsurge in debt that South African households possess and the rest of the world. Barba and Pivetti (2009) postulated that household debt growth has fuelled and propelled consumption. Inevitably this has contributed to the weakening in household level of saving, that's indirectly impacting investments and the general state of the economy.

Recently almost every South African household finds itself in some form of debt. More than 22 million South Africans are credit-active consumers and 71.90 per cent of household income goes to debt repayment as of December 2019. Consumers considered as having complied with all obligations, while not being subject to any form of sanction, suspension, or discipline on 31 March 2019 were 15.55 million. About 8 million households were three months behind repayment in 2013 which rose to 9.95 million households by June 2014 and by December 2019 that figure has shot to 10.15 million without considering any credit which is not offered through unrecognized money lenders (NCR, 2014; NCR, 2019). Interestingly, also to note are the changes in household unsecured debt. It increased starting at 7.75 per cent in the fourth quarter of 2007 to 17.8 per cent by the third quarter of 2014 and to a high of 31.17 per cent (NCR, 2014; NCR, 2019). The total of new credit accessed by South African consumers at the of the

2019 first quarter was R127,86 billion. This has risen by R6,24 billion (5.13%) in comparison to R121,62 billion which was accessed in the respective quarter of the subsequent year 2018. As stated by the NCR report (2019), all forms of credit only excluding developmental credit, though they explained it by accounting it to seasonal trends, have dropped for the first period of 2019. It is of interest in this paper to tally the debt statistics of households to that of the economy's performance and establish whether there is a link between household debt components and the economy's' performance.

1.2. Problem Statement

Like many other economies, South African expenditure may perhaps be positioned at the core of demand forecasting, estimation, and analysis. As a result, credit consumption may play a fundamental part in determining the performance of the economy. Since, at least the pre-independence era in South Africa, how consumer debt and aggregate macroeconomic performance interact has always been a reason for uneasiness among policymakers, legislators, and economists. From varying economic seasons, when consumer debt grew as the economy booms this uneasiness and concern has been rekindled now and again (NCR, 2019). Around 2007, the total amount of household debt was approximately R1 trillion. As of the end of 2022, this figure had more than doubled to reach about R2.2 trillion, while the number of credit agreements entered into was 4.36 million (NCR, 2022). On the other hand, South Africa's economy over the study period has grown at an average of 0.33%, which is considerably lower than its other countries which are in the same upper-middle-income category. The increase in debt consumption by households is evident while on the other hand the stagnancy of the economy is also perceptible.

Household debt has its pros and cons (Barba & Pivetti, 2009; Bosch, *et al*., 2021; Drehmann, *et al* 2015; Fatoki 2015; Lombardi, *et al*., 2017). Excessive use of debt can lead to a phenomenon known as debt overhang, a scenario when a borrower's debt surpasses their ability to repay in the future. Fatoki (2015) pointed out that, another downside of household debt will be debt servicing. Household debt overhang and debt servicing problems make bank balance sheets weak by increasing non-performing loans. Barba and Pivetti (2009) tabled that, the weakened balance sheets may resultantly be the cause of deterioration of credit availability which exerts additional weight on house prices, and also prices of different assets may experience downward pressure. When house and asset prices go down wealth and collateral also decline, which makes the household debt problem even more gloomier. Worth noting is the fact that household debt issues might have a huge negative influence on consumption. Results may include lower economic growth and higher unemployment levels, impacting household income and promoting the continued downward spiral of an economy (Fatoki, 2015).

As more and more South Africans become credit active and get more and more indebted as prophesied by the household statistics, there is wisdom in understanding how household debt and the performance of the economy relate and planning accordingly. One of the shortcomings of the household debt literature is that it neglects the fact that every country has a unique debt structure. The composition of household debt is not the same across countries. Some countries have high new debt cases; some are primarily populated by unsecured debt others by mortgage loans. This is influenced by variances in such factors as consumer behaviour, the strictness of regulation, the level of economic development, and differences in financial literacy. Not only is it different across countries it is also different across time. The limitation of neglecting the debt structure and composition is that the main and most influential components of household debt on economic performance are never isolated and quantified. The result is a blanket of policies that aim to resolve the debt situation homogenously.

1.3. Research Questions

Against this backdrop, this study attempts to answer the following questions

i. What is the general trend, structure, and composition of household debt in South Africa?
ii. Is there a causal link between household debt and economic performance in South Africa?

1.4. Research Objectives

The study aims to examine and provide insight into the relationship between household debt and economic performance in South Africa. The specific objectives of this study are to:

i. Characterize the general trend, structure, and composition of household debt in South Africa.
ii. Examine the causal relationship between household debt and economic performance in South Africa.

1.5. Contribution of the Study

In literature, a lot has been documented on the causes and implications of household debt in developed countries, however, a few studies that are focused on South Africa's economy exist. The emphasis of most of the studies that have been conducted on household debt in South Africa has been heavily concentrated on examining the link between consumption and household debt (Bosch, *et al*., 2021, Mutezo, 2014; Mian, Sufi, & Verner, 2017; Nkala & Tsegaye, 2017). Another strand of studies concentrations on what causes South African households to consume more debt (Barba & Pivetti, 2008; Coletta, De Bonis, & Piermattei, 2019; Karambakuwa & Ncwadi, 2021; Nomatye & Phiri, 2017). These studies pursue understanding the underlying reasons why households borrow increasingly as portrayed by the statistics. Much has been learned from these studies.

Nonetheless, this study through focusing on household debt like many other studies will take a further step and focus on the relationship between the composition and structure of household debt with South Africa's economic performance. Household debt structure and composition change over time and are peculiar to the population and financial system of a country. From the literature causes of household debt have varied depending on the country's level of development. By implication composition of household debt thus vary as determined by that country's peculiar characteristics.

Therefore, an attempt is made in this paper, to isolate and quantify the influence of household debt components which are mortgage loans, debt service ratio, and household debt to income ratio on the performance of the economy, in the short and long run. Exploring which of the aforementioned components of household debt carries a greater bearing on the economy may help in understanding the dynamics of household debt and economic performance. That information is essential in structuring relevant policies in dealing with the issue of increasing household indebtedness. Thus fresh questions are raised in this study, with the hope that the study will answer these questions by adding more knowledge and information, which may be useful in dealing with the dragged-out problem of increasing household indebtedness by South African households.

1.6. Organization Of The Study

The whole study is comprised of six chapters. Chapter two comprises an outline of the South African household's debt structure, trend, and composition. Chapter three describes and unpacks the theoretical, and empirical literature reviews. Chapter Four houses the theoretical and methodological framework of the study. ln chapter five estimation results are presented and interpreted. Finally, chapter six, concludes the study with the presentation of summary, conclusions, and recommendations. In this concluding section limitations of the study are presented and suggestions about areas of further research are outlined.

CHAPTER TWO

OVERVIEW OF SOUTH AFRICA'S HOUSEHOLD DEBT

This chapter starts by giving the general definitions of debt with special emphasis on household debt. The overall debt situation of South Africa is then given and the chapter will end by tracking and illustrating the changes that have been taking place as far as household debt is concerned.

2.1. Defining Household Debt

Debt is generally defined as a financial liability that rises when money is borrowed or goods and services are acquired on credit, with a pledge to recompense in the future (Cecchetti, Mohanty & Zampolli, 2011). Household debt, according to OECD (2023), refers to "the total liabilities of households that require payment of interest or principal by households to creditors on fixed dates in the future". For numerous reasons, consumers enter into credit transactions, including their eagerness to consume now rather than later (Lucas, Goodman & Fabozzi, 2008). By using consumer debt, households sacrifice future consumption as they use their future income to pay off debts and interest charges (Paile, 2013). As a result, in the future, their purchasing power is reduced (Lucas *et al*., 2008; Cloyne & Surico, 2017).

Households have several kinds of credit instruments at their disposal, with loans being categorized as either secured or unsecured (Lucas *et al*., 2008). Secured loans are guaranteed with collateral and typically carry lower interest rates than unsecured loans, which rely heavily on the borrower's credit rating as there is no collateral involved. Unsecured loans, such as personal loans, store credit, and credit cards, are generally easier to obtain, making them a popular choice for quick cash (Prinsloo, 2002). Mortgage debt is an example of secured debt that is guaranteed by houses, buildings, or land. In contrast, unsecured debt does not have any special claim on a borrower's assets in the event of default

2.2. Household Debt Composition

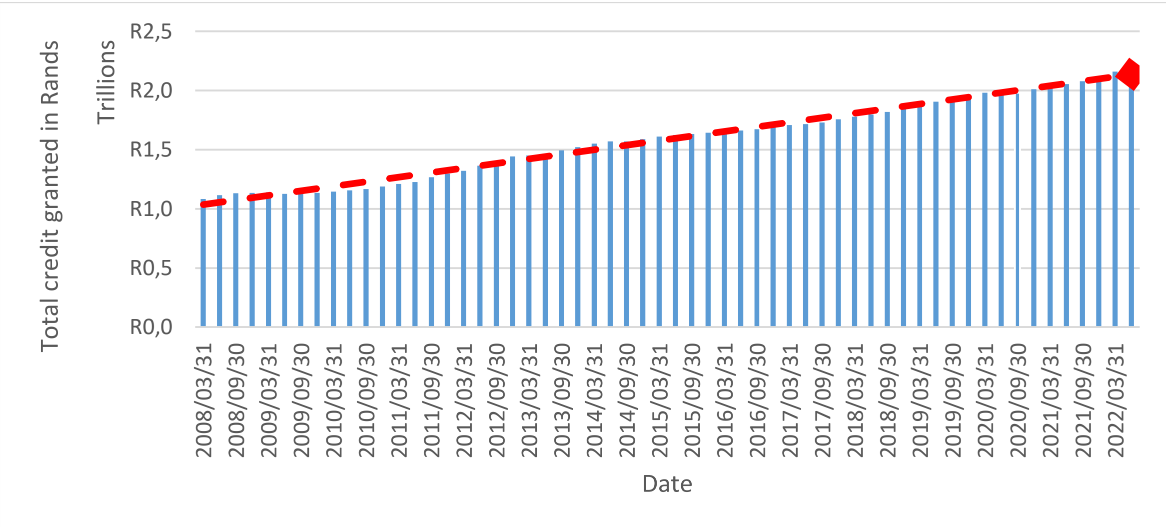
Household sector debt is composed of two main components; household credit and mortgage advances. According to Paile (2013) and Prinsloo (2002), household credit can be classified into several categories, including personal loans at banks, credit card facilities, lay buy purchases, lease agreements, and open accounts. Personal loans at banks comprise of overdrafts and other advances issued to individuals. An installment sale transaction is a credit loan that allows one party to acquire an item for immediate use in exchange for a promise to pay periodically in the future. As per Prinsloo's (2002) explanation, although the buyer obtains ownership of the goods, the seller reserves the right to reclaim them if the buyer fails to adhere to the terms of the agreement.

Credit card facilities are also a form of household debt that provides an easy way of buying and only paying at a later stage. Credit cards are generally due within a month, but consumers can also access budget facilities to extend the payment period. Households often acquire mortgage loans to purchase real estate, utilizing the property as collateral for the loan. As per standard practice, the loan amount is calculated based on the borrower's yearly income and the property's worth, with repayment scheduled over an extended period, typically spanning between 20 to 30 years. (Prinsloo, 2002).

Prinsloo (2002) explains that, in line with national accounting conventions, the household sub-account encompasses the ongoing dealings of non-corporate businesses, non-profit organizations, and private households. Incorporating credit offered to non-corporate businesses and the liabilities of non-profit organizations that cater to households, the household sector's debt encompasses a broader scope. Prinsloo (2002) points out that empirical evidence indicates that private households' debt constitutes more than 93 per cent of all debt held by South African households. This suggests that the link between anticipated consumer credit and private consumption expenses is mainly influenced by consumer borrowing patterns.

2.3. Changes In Household Debt

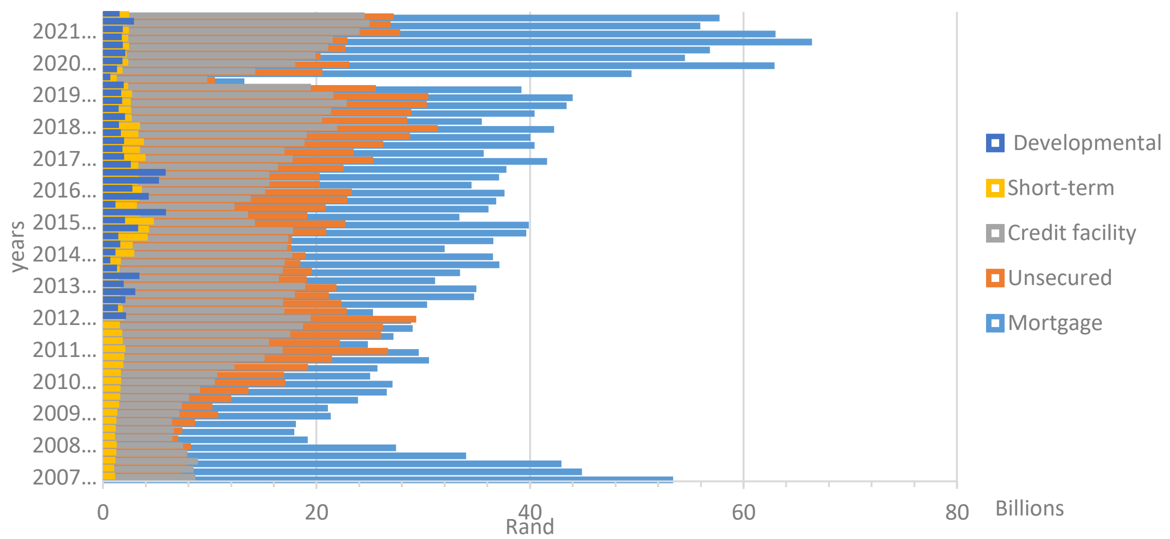
Fig 1: Gross debt granted to households



Source: Authors' own computations

The gross household debt in South Africa has risen (NCR, 2022). Fig 1 shows that since the financial pandemic of 2008, the total amount of household debt granted to households has increased continuously and steadily. In 2007, gross household debt sat at about one trillion Rand. By the beginning of 2022, it was sitting at about R2.2 trillion. Thus in just above a decade, the volume of liability that households possess doubled! The composition of household debt has changed too, this is explained by new developments in the banking industry (Clark & Rees, 2012). As graphically portrayed in Fig 2, mortgage loans constitute more than 50 per cent and have always been the main element of household debt. There were not many variations in short-term debt and secured debt and both contribute an insignificant proportion compared to the others. According to the graph developmental loans started around the end of the year 2012, and have the potential to grow.

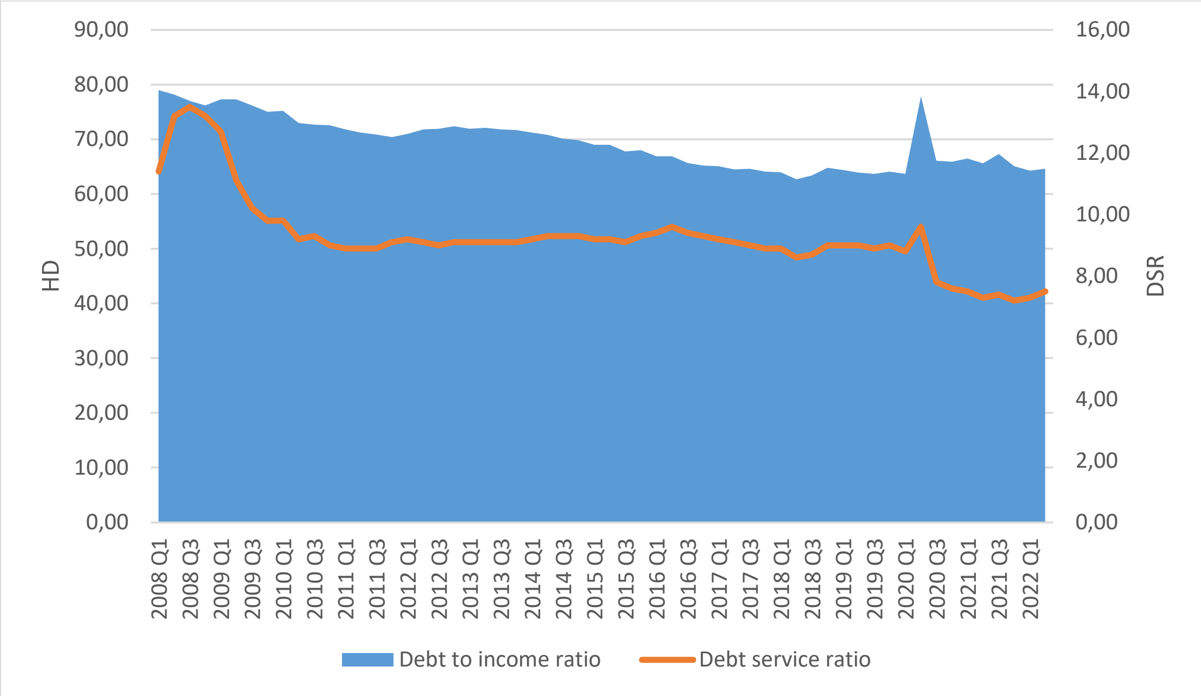
Fig 2 Household debt composition



Source: Authors’ own computations

The effects of the 2008 crisis and the COVID-19 pandemic are also noticeable on the graph. During these two periods, household debt decreased sharply and instantly increased again after the events and even went beyond the previous highs. This may theoretically be explained by the Life cycle hypothesis, whereby households will use debt to smoothen their consumption and boost incomes through difficult times.

Fig 3 Household debt to disposable income and Debt service ratios.



Source: Authors' own computations

Definition of debt and presentation of an overview of the types of debt held by households in South Africa were furnished in this section. Additionally, an effort was made to visually demonstrate the evolution of household debt in terms of both its composition and total amount. The literature review is given in the following section.

CHAPTER THREE

LITERATURE REVIEW

The preceding chapter focused on the household debt landscape in South Africa, highlighting trends and shifts in both the level of indebtedness and the makeup of household debt over time. From the previous chapter it was shown that there is an upsurge in the indebtedness of households, the cost of servicing debt as well as the proportion of household debt to income has continued to be relatively high, and the number of over-indebted persons have been on the rise. This chapter explores the theoretical literature review, followed by an empirical literature review on household indebtedness. An attempt is made to understand what other researchers have to say about the theoretical and relational dynamics between economic performance and household indebtedness and, the implications thereof.

3.1. Theoretical Literature

Various theories have been proposed to describe the phenomenon of household indebtedness. Fisher (1988), posits that a robust link between household debt and consumption exists. According to this postulant, if a household's current income falls short of its current consumption needs, it will resort to borrowing to bring future consumption into the present. Similar to other economies, credit consumption is likely to occupy a central position in driving aggregate demand in South Africa, making it a key factor in economic analysis.

3.2. Debt-Consumption Theories

Saad (2011) identifies four models of modern debt consumption: The Absolute Income Hypothesis, the Intertemporal Consumption Choices, the Life Cycle Hypothesis, and the Permanent Income Hypothesis. These are discussed next. Among these models, Keynes' (1936) theory is considered the pioneer in the study of consumption behaviour, which empirically established the link between consumption expenditure and macroeconomic behaviour. On the other hand, the Intertemporal consumption choices by Irvin Fischer lays the foundation for subsequent PIH and LCH theories (Mankiw, 2009).

3.2.1. Keynesian Theory of Income

According to Keynes, the consumption behaviour of households is determined by the current level of disposable income available to a household (Keynes 1936). Below is the Keynesian consumption function:

$$C = a + cY^d \qquad 0<c<1 \qquad (3.1)$$

Where C is consumption, a is consumption that does not vary with income, c is the marginal propensity to consume, and Y^d is disposable income.

Autonomous consumption is that consumption that is consumed even when current income is zero, thus Keynes (1936) suggested this could be a result of dissaving donations and borrowing. Autonomous is also referred to as the intercept on the Keynesian function curve.

Nevertheless, Keynes postulates has been criticized on numerous grounds (Duesenberry, 1949; Kuznets, 1952; Friedman, 1957; Sorensen & Jacobsen, 2005; Chamberlin & Yeuh, 2006). Chamberlin and Yeuh (2006) postulated that the main argument of the theory was based on the theory of consumer choices, which implies to be simplistic. They question if the decision to consume or save is only dependent on disposable income or if it is dependent on other factors. Sorensen and Jacobsen (2005) support Chamberlin and Yeuh's (2006) assertion that consumption is influenced not only by disposable income but also by anticipated income and expected rate of interest. Some economists argued that consumption is nothing but rational planning. Among these economists was Duesenberry (1949), who believed that consumption is a social phenomenon. Thus, Fisher went on to introduce a consumption model from a psychological perspective incorporating expected incomes (Mankiw, 2009).

3.2.2. Irving Fischer Theory of Intertemporal Consumption Choices

The consumption function introduced by Keynes relates current consumption to current income. This relationship, however, is incomplete at best. When people decide how much to consume and how much to save, they consider both the present and the future. In Fishers' theory the consumer is assumed to be forward-looking and chooses consumption for the present and future to maximize lifetime satisfaction (Mankiw, 2009). While Keynes postulated that, current consumption depends only on current income Fisher argued that current consumption depends on the present value of lifetime income. Consumer choices are subject to an intertemporal budget constraint, which is a measure of the total resources available for present and future consumption. Using a basic two consumption periods, the budget constraint can be illustrated as in equation 3.2.

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r} \quad \text{......3.2}$$

Where:

Y_1, Y_2 = income in periods 1, 2

C_1, C_2 = consumption in periods 1, 2

1+ r = discount factor (r is the interest rate)

This equation states that the sum of current consumption (C_1) and the discounted value of future consumption (C_2 / (1 + r)) should not exceed the sum of current income (Y_1) and the discounted value of future income (Y_2 / (1 + r)). The discounting factor (1 / (1 + r)) reflects the time value of money, accounting for the opportunity cost of saving or borrowing. In Fisher's theory, the timing of income is irrelevant. Consumers can borrow and lend across periods. Consuming less than income leads to saving while consuming more than income received is a result of borrowing. If the consumer learns that future income will increase, the consumer can spread the extra consumption over both periods by borrowing in the current period. However, if consumer faces borrowing constraints, then the consumer may not be able to increase current consumption (Mankiw, 2009).

One of the weaknesses of Irving Fisher's Intertemporal Choice theory is its assumption of perfect rationality and foresight on the part of individuals. However, in reality, individuals often struggle with limited information, imperfect foresight, and emotional biases that can lead to suboptimal decision-making (Chamberlin & Yeuh, 2006). The theory fails to adequately account for external factors and uncertainties that can significantly impact intertemporal choices. Additionally, the theory assumes that individuals have access to perfect capital markets, allowing them to borrow and lend at a constant interest rate. In reality, interest rates fluctuate, and individuals may face borrowing constraints or high transaction costs, limiting their ability to engage in intertemporal choice optimally. Furthermore, the theory does not consider the impact of social and cultural factors on intertemporal decision-making. Individuals may be influenced by societal norms, peer pressure, and cultural expectations, which can shape their preferences and choices over time (Sorensen & Jacobsen, 2005). Despite these shortcomings Fishers’ theory is the building block of the subsequent theories of the Permanent Income Hypothesis and Life Circle Hypothesis.

3.2.3. Permanent Income Hypothesis (PIH)

Friedman's (1957) PIH posits that an individual's present consumption patterns are shaped not only by their present income, but also by their anticipated future income or permanent income. According to Friedman's (1957) PIH, an individual's consumption habits are not impacted by fluctuations in transitory income, but rather by fluctuations in their permanent income. As a result, households may turn to debt as a means of maintaining consistent consumption patterns over time.

The permanent income hypothesis (PIH) has important consequences, including the notion that the degree of permanence in household income changes should correspond with the degree of responsiveness of consumption to current income. In other words, the elasticity of consumption should be higher when a larger proportion of change in income is due to permanent deviations. To test this implication, PIH. The most basic state of the PIH can be expressed through three equations:

$$C_y = k(i, w, u)\, y_p \qquad (3.3)$$

$$y = y_p + y_t \qquad (3.4)$$

$$c = c_p + c_t \qquad (3.5)$$

Where: C_y = consumption, i is interest rates, u is unit tastes and preferences for consumption, y_p is permanent income, y_t is transitory income, c_p is permanent consumption and c_t is transitory consumption

Equation 3.3 describes how permanent income and permanent consumption are related. Equation 3.3 postulates that the relation between the two variables is autonomous of the proportion of permanent income nevertheless it also relies on other variables; such as interest rates, the ratio of nonhuman wealth to income (w), and individual tastes and preferences (u). Other significant factors include the number of household members and their characteristics, this also includes temporary elements that may impact both income and consumption. Equations (3.4) and (3.5) define the association between the permanent components and the measured magnitudes.

Duesenberry (1949) adds that consumption tends to be "sticky downwards," meaning households are more likely to increase spending when income rises but reluctant to decrease spending when income decreases. Mutezo (2014) uses the term "ratchet effect" to describe this phenomenon. In addition, households may make transitory purchases that do not require immediate consumption, such as discounted items or purchases made from bonuses or lottery pay-outs, as explained by Thornley (2008).

3.2.4. Life Cycle Hypothesis (LCH)

The LCH was formalized by economists Fisher, Harrod, Ando, and Modigliani, with the latter being the most popular proponent of the theory (Modigliani, 1986). The LCH proposes that households take on a significant quantity of debt to maintain stable consumption levels and to obtain durable possessions, such as land. The theory assumes that consumers strive for utility maximization subject to a budget constraint, and therefore, when they consumption smooth using debt, they can improve their utility. According to the model, consumption patterns in a given period are predicated on expectations about income during an individual's lifetime (Modigalini, 1975).

If we assume that household income tends to rise with time, households may exhibit a negative savings rate in the initial stages of their working life. However, as they progress through their careers and their earnings increase, their savings are likely to grow while their level of debt declines. During retirement, households may once again exhibit a negative savings rate, akin to the initial stages of an individual's working life. During that phase, consumption patterns are typically supported by the earnings acquired throughout their working years. To support their present-day consumption needs, households may resort to borrowing during periods of low income. Thus, debt is viewed as a commonplace aspect of consumer behaviour.

The LCH framework posits that the phase of the household's life cycle household shapes savings and expenditure patterns, with debt being used as an instrument to maintain a stable consumption path over an individual's expected lifetime. As Dwivide (2010) observes, individuals will inevitably incur some level of debt, and they may do so to adjust their expenditure patterns across different phases of their life. Individuals often choose to repay such loans in the course of periods when their earnings are comparatively higher.

The LCH suggests that the ability of consumers tends to differ and varies with stages of life (Dwivedi, 2010). In comparison to the elderly, on average young consumers tend to have lower income, thus they tend to borrow more. When they reach their middle ages their incomes tend to increase may be due to promotions, which come due to, for instance, more experience and more education, this allows them to settle their outstanding debts and build up their savings. Thus, in their elderly days, they stop saving and dis-save.

The LCH formula is as below:

$$C = (WL/NL)*YL \tag{3.6}$$

Where C is annual consumption, WL is years of working life, NL is the number of years of life and YL is annual labour income

WL/NL is a marginal propensity to consume, which changes with the consumers' age. The model assumes constant consumer consumption throughout the lifetime. Assets are accumulated during working years and dissaving start at retirement, thus consumption will continue uninterrupted during retirement.

The weakness of this analysis is it doesn't take into account the possibility of retrenchment during their working period. More so, savings may not be enough to sustain consumers during retirement, implying that consumption levels may not be the same before and after retirement and retrenchment. LCH do not take note of those households which have income that is just enough for consumption, thus they cannot save during their working years. Even though they may have enough income to consume and save, some households seem to have bad financial management skills. To summarise not all households will save during their working years.

This study is founded in the theoretical underpinnings of the LCH framework. South Africa's population is mainly comprised of a young generation and is strewn with high-income equality. This explains why most middle to low-income workers are heavily indebted. They use debt to smooth consumption. According to the NCR report (2019), most debt is used for mortgage loans and to buy durable goods such as cars, cell phones, and clothes.

3.3. Empirical Review

These are related studies that are relevant to understanding the subject and dynamics of household indebtedness in South Africa and across the globe. Literature on household debt has developed.

In the wake of the 20th century, most governments in different countries discovered that the size of household debt in their countries was significantly rising. Research was then dedicated to understanding the reasons behind the rising. In a study conducted in the USA, Barnes and

Young (2003) developed an adjusted OLG model to elucidate on the aspects that backed the rise of household debt during the 1990s. Their results out pointed that the growth in household debt during this period could be attributed to real interest rates, expectations of incomes growing, the change in demographics, and the reduction of credit restrictions. The consensus of studies on causes of household debt was that the rate, house prices, level of unemployment, inflation, and low wages are the main drivers of rising household indebtedness (Bridges & Disney, 2004; Bunn & Rostom, 2014; Debelle, 2004; Disney, Bridges & Gathergood, 2008; Kereeditse & Mpundu 2021; Meniago, Petersen, Petersen, & Mongale, 2013; Philbrick & Gustafsson, 2010). The studies based on developed countries differed from those from developing countries in that, they identified savings and retirement as significant causes of household debt increases (Jacobsen 2005; Kim, Lee, Son, & Son, 2014; Martins & Villanueva 2003). In South African studies, over and above, income inequality, financial illiteracy, and loose financial regulation were also found to be significant contributors to increases in household indebtedness. Karambakuwa and Ncwadi (2021) echoed the sentiments of the concerns of increasing household debt in South Africa using a systematic literature review to pinpoint causes which are peculiar to South Africa. Their findings suggest that female-headed households, renting households, large households, urban-based households, households with a mortgage and households where the head is not working, is sick or disabled were more likely to be over-indebted in South Africa.

In response to these findings and in some cases the impact of the financial pandemic of 2008, numerous studies were conducted on the effectiveness of financial regulation, financial innovations, and accessibility on household debt (Kim, 2000; Kim *et al*., 2014; Fatoki 2015). Kotzè and Smit (2008) examined entrepreneurship activity in South Africa and explored the influence of individual debt on entrepreneurship. The study aimed to determine the percentage of income spent on personal debt, identify behaviours that lead to poor financial management, and uncover reasons why individuals were not saving. The significant levels of household liabilities in South Africa can be traced to a dearth of a healthy savings philosophy amongst South Africans, arising from limited financial literacy and the tendency of households to spend nearly all their earnings. This point echoes the concern of the NCR (2012) that, consumers were spending more than they earn. Studying the reasons and significances of over-indebtedness in South Africa using the Life cycle hypothesis, Fatoki (2015) attributed the increase in household indebtedness to financial deregulation, financial innovation, reckless behaviour of lenders, and unethical behaviour of the credit markets.

The literature on household debt also focuses on the influence of household debt on economic indicators and variables. A consensus exists that household debt significantly affects economic performance through interactive terms. Young-Sik (2009) notes that increasing household debt bears both beneficial and detrimental consequences on economic performance. During the global financial crisis, increased household loans prevented a sudden decline in consumption and housing prices, which eased the liquidity strain on low-income households. However, Mutsonziwa and Fanta (2018) argue that over-indebtedness impoverishes indebted households, while Bosch et al. (2021) suggest that the rich are most affected by deleveraging following an economic downturn.

Household debt affects levels of savings. Fatoki (2015) found that high debt levels harm savings, consumption, investments, financial markets, and economic growth. Barba and Pivetti (2008) showed that the extent of consumer credit has implications for production, as it influences the quantum of savings directed towards investment. This emanates from the notion that a higher propensity to save is strongly correlated with higher economic growth. In summary, the literature suggests that the enormous levels of household debt have undesirable effects on long-term economic growth (Berisha & Meszaros, 2018). In addition, the correlation between household debt and succeeding economy's' growth rates is non-linear. When there is an upsurge in debt it leads to a decline in GDP growth in the long run, but a decrease in debt does not necessarily result in a boost in GDP growth (Mian et al., 2017).

Moreover, the focus of the study has also been allocated to debt sustainability. According to Debelle (2004), either having a sustainable amount of debt or the growth of that debt is unsustainable there will still be significant macroeconomic repercussions. The presence of debt in households' balance sheets makes households more sensitive to the rate of interest income shocks. Moreover, household consumption spending becomes very susceptible to changes in expectations of future income. The way the household debt is distributed is important in defining the degree of households' sensitivity to fluctuations in income levels and the rate of interest. The effects of increasing household debt vary contingent on whether the economy behaves as expected or experiences unexpected shocks. In situations where the shocks are expected, the effect of increased debt is minimal, while in the case of unexpected shocks, the impact is more significant. Therefore, the ability of households to cope with changes in the economy depends enormously on the distribution of debt and their preparedness for potential economic shocks.

An exponential increase in household debt can generate economic vulnerabilities (Pazarbasioglu, 2014). Kuhn (2010) made a similar observation to Debelle (2004), stating the that sensitivity of households to shocks increases as household debt increases. Beaumont *et al*. (2005) noted that this increased sensitivity of households means that monetary policy and macroeconomic goals of the Reserve Bank can be achieved with minimal adjustments to interest rates. Consistent with later studies by Mian, *et al*, (2017) and Kereeditse and Mpundu (2021), Bunn and Rostom (2014) concluded that, significant proof exists, that a general level of household credit which is exorbitant is closely related to deeper economic downturns and long-drawn-out recoveries. Households with huge amounts of debt had to reduce spending by a great ratio compared to their incomes after the 2007-2008 financial crisis. Bunn & Rostom (2014) further argued that this translated to a prolonged recovery of the economy, and rendered the monetary policies relatively ineffective.

After focusing on the causes and the implications of household debt, studies have recently started to focus on how households should manage their debt consumption in a bid to keep the debt sustainable and mitigate the negative effects of high levels of debt. In a study in South Africa by Mbukanma and Rena (2022) using an empirical approach, findings revealed that South African household with financial knowledge has more potential to manage and control their level of indebtedness. Mbukanma and Rena (2022) postulated that, alternate sources of income and budgeting are key in curbing debt spirals. The literature confirms that lack of financial literate consumers contributes to risk of being indebted (Seane, Mah, & Saah, 2016). A positive correlation between financial literacy and savings was also noted in the study as it is evident that they are low. Therefore, South African consumers are encouraged to spend less and save more in order to lower debt. It is imperative that households have the necessary financial skills to avoid misusing credit as its advantage can decrease quickly.

In conclusion, literature on household debt has developed. In literature, the main observed interest in studying household debt was to understand the underlying causes of rising debt and the implications. The focus then shifted to understanding the sustainability of this debt. In literature, the effects of debt are numerous and diverse. The effects are well appreciated and the relationship well-documented. Nonetheless, literature has looked at the issue of household debt as an umbrella. Literature scarcely looked into which of the household debt components has the most influence on economic performance.

CHAPTER FOUR

THEORETICAL FRAMEWORK & METHODOLOGY

The following section sheds light on the data collection procedure and the methodology employed for model estimation in this study. The methodology adopted is described and outlined.

4.1 Theoretical link between debt and growth

An economy's performance, represented by growth in this study, is a function of consumption. In various countries, on average consumption expenditure constitute approximately 60 percent of GDP (OECD, 2023). Increases in household consumption lead to increases in demand thus boosting economic performance (Karambakuwa & Ncwadi, 2021). Debt-consumption theories place consumption at the hub in explaining total expenditure in the economy. A significant portion of household consumption is funded by debt. This has implications for economic performance. In the short term, household debt tends to boost consumption, but in the long term, consumption will likely decrease as households repay their debt (Saad, 2011). The quantity of debt owned by households is a crucial factor in explaining and predicting economic performance. To represent household debt levels, this study uses the household debt to disposable income ratio (HD). According to the NCR (2022), mortgage loans (ML) constitute of more than half of aggregated household debt. Therefore, fluctuations in ML are important in explaining household debt. Although an increase in ML may initially boost consumption as expenditure increases, in the long run, as loan repayments are made, consumption and GDP may decline. The cost of servicing debt is a critical element in defining the optimal amount of debt. High debt service costs lead to lesser amounts of financial obligations as the opportunity cost associated with holding debt increases (Karambakuwa & Ncwadi, 2021). This study uses the debt service ratio (DSR), which expresses the aggregate cost of servicing debt calculated as a proportion of total earnings, to indicate the cost of household debt.

The LCH purports that households' smooth expenditures over their lifetime by taking out debt. During their young working age, they take out debt on durable goods and repay later as their incomes grow. South Africa has a young population, and in line with the LCH, they take out debt to buy durable goods (houses cars, and cell phones). In this way, they smooth their consumption in periods of low income by adopting debt. A significant part of the populace is in the middle to low-income bracket. They cannot afford to buy houses and many other goods and services on cash thus they resolve to use credit. This in part, is explained by the LCH. As they engage in this debt consumption process, the economy's performance is affected. HD, DSR and ML all feed into consumption, thereby influencing consumption and ultimately impacting growth. This study is aimed at analysing how HD, DSR, and ML affect EG.

4.2. Model Specification

To account for the impact of household debt on economic growth the income equation (4.1) is utilised.

$$Y = C + I + G \quad \text{……………………………………………………………………} \quad 4.1$$

where Y is GDP, C is consumption, I is gross capital formation (Investments) and G is government expenditure. Changes in Y are denoted as economic growth and can be positive or negative. Since Y is a function of C, I and G, changes in these variables will affect economic growth. From the previous sections it was established that household debt is directly linked to consumption. The model employed in this study therefore establishes a connection between the growth of the economy and the aggregate level of household debt (represented by the household debt-to-income ratio), the cost of servicing household debt (measured by the debt service ratio), and the level of mortgage loans through consumption. The functional equation for consumption can be expressed as:

Consumption = ƒ (household debt to income ratio (HD), debt service ratio (DSR), mortgage loans (ML)).

Therefore:

$$C = HD + DSR + ML \quad \text{……………………………………………………………………} \quad 4.2$$

Substituting C (equation 4.2) into equation 4.1 will result in equation 4.3 below.

$$Y = HD + DSR + ML + I + G \quad \text{………………………………………………………} \quad 4.3$$

Taking into consideration changes in Y to account for economic growth and stating equation 4.3 in a linear form yields equation 4.4.

$$EG = \beta_0 + (\beta_1 HD_t + \beta_2 DSR_t + \beta_3 ML_t) + \beta_4 I + \beta_5 G + \varepsilon_t \quad \text{…………………………………} \quad 4.4$$

Where EG = economic growth calculated as changes in the real gross domestic product (used as a procurator for macro-economic performance) at time t, β_0 = constant, β_1 HD_t = Household debt to income ratio at time t, $\beta_2 DSR_t$ = Debt service ratio at time t, $\beta_3 ML_t$ = quarter to quarter change in mortgage loans at time t, $\varepsilon_t =$ error term.

In this section, the model was specified. The subsequent sections provide an in-depth explanation of the steps taken to estimate the model.

4.3. Unit Root Tests

The majority of time series in macroeconomics have unit roots. These series are usually subjugated by stochastic trends (Dickey & Fuller, 1979; Dickey & Fuller, 1981; Phillips & Perron, 1988; Kwiatkowski, *et al.*, 1992). According to theory, to estimate a VAR, it is crucial for all variables incorporated in the model to display stationarity (Brooks 2008). Stationarity is essential for two reasons (Junkin, 2011; Liu, 2007). First of all, forecasting is only conceivable when one uses stationary series, and moreover stationary series reduces the chances of an erroneous regression. Brooks (2008), pointed out that series may have two types of stationarity. They can either be strictly stationary or weakly stationary. A time series is considered strictly stationary when distribution of its values is constant over time, implying that the probability of a variable falling within a particular range is the same at any time in the past or future (Brooks, 2008). According to theory, to estimate a VAR, it is crucial for all variables incorporated in the model to display stationarity (Brooks 2008).

$$X_t \approx I(d) \qquad \text{4.5}$$

The level of integration, represented by d in Equation 4.5, explains whether data are stationary or not. Lütkepohl (1993) notes that the level of integration is a crucial determiner of stationarity.

To explore the existence of unit roots in time series, this study utilizes the ADF and PP tests. Structural breaks can distort the power of these tests and lead to deceptive conclusions (Fasanya *et al.*, 2021[b]). Therefore, to improve the robustness of the model, unit root test with breaks is executed, specifically the ADF test with structural breaks. The null hypothesis of both the ADF and PP tests is that Xt has a unit root, whereas the alternative hypothesis is that it does not have a unit root. When the test statistic is greater than the critical value at the specified level of significance, the null hypothesis is not rejected, and it is determined that a unit root is present in the series. In contrast, when the test statistic is lower than the critical value at the relevant significance level, the null hypothesis is rejected, and it is determined that the time series does not have a unit root.

Once the unit root in each data series was established, the subsequent stage was to ascertain the presence of cointegration, which is a long-term equilibrium correlation between variables. To conduct the test, an appropriate lag length was initially computed to identify the ideal length of lags that would provide the best fit for the time series data.

4.4. Lag Length

Optimal lags are key in econometric modelling, as choosing a too small or too large lag length can result in a biased and mis-specified model or a waste of degrees of freedom. Therefore, determination of the optimum lag length for each variable in the model is vital. Optimum lag length denotes the most suitable number of lags to be incorporated in the econometric model for each variable (Brooks, 2008).

Several information criteria are available to estimate the appropriate lag length. These criteria help select a model that provides the best balance between goodness-of-fit and parsimony. Another intuitive way to define the lag length is to let the data frequency determine an optimal lag. For instance, if the data is monthly, twelve lags may be used. By selecting the optimum lag length, the model can capture the important dynamics of the variables and provide accurate forecasts.

4.5. Cointegration Test

After the integration order of variables was determined through stationarity tests and the optimal lag length was defined, next was perform a cointegration test. Through cointegration dynamics of variables are modelled, over both short and long term periods (Dunis & Ho, 2005; Granger, 1988). Cointegration tests are used to determine if a basic VAR or VECM and Toda Yamamoto must be used to characterise the relationship between variables. Salisu (2015) pointed out that, the distinction between a VECM and Toda Yamamoto comes from the uniformity of the order of cointegration. Assuming cointegration of the same order in variable, for example, if they are all I (1), then a VECM should be employed. However, if the series levels of cointegration are different Toda Yamamoto should be applied.

The Granger and Johansen tests are popular methods for examining cointegration, but the Johansen cointegration test is often preferred for analysing multivariate series data because it has proved more effective. This paper utilizes the Johansen cointegration test for this reason. If the test reveals cointegration between the variables, it indicates the presence of a long- run relationship among them. This suggests that there is Granger causality between the variables in at least one direction. To determine the number of cointegration equations between variables, the trace and max-eigenvalue tests are employed.

4.6. Diagnostic Tests

The model is then subjected to diagnostics tests. This is an essential stage of time series modelling as it ensures that the model adequately explains the relationship between economic growth and household debt dynamics. Before proceeding to estimation techniques Salisu (2015) emphasised that the model diagnostic tests and post-estimation tests should be executed to guarantee the validity of the results. More specifically Salisu (2015) argued that the model be checked for auto autocorrelation. Following this reasoning the residual autocorrelation LM test is used for diagnostics.

4.7. Granger Causality Test

To ensure the reliability of the model, it is imperative to test its robustness, while the cointegration test helps to verify the presence of long-term relationships between variables. If such relationships are found, an error correction model (ECM) is utilized to establish the long-run equilibrium relationship (Moftah & Dilek, 2021). However, if no cointegration relationship exists, the short-term relationship is analysed through the difference variable. The Granger causality test is a method used to ascertain if one variable is valuable in predicting another. However, traditional Granger causality tests may be ineffective when the order of integration is unclear or different, as noted by Moftah and Dilek (2021). To overcome this, TY causality test (Toda & Yamamoto, 1995) is often used, as it allows for variables that are cointegrated at different or unclear orders. Based on this understanding, the TY causality test is utilized due to the different cointegration levels exhibited by both standard unit root tests and unit root test with structural breaks.

4.8. Estimation Technique

To allow for characterisation of the link between household debt and economic performance, this study employs a VAR model. VAR models are advantageous as they account for endogeneity in the variables (Farzanegan & Markwardt, 2021). The study investigates the dynamic effects of household debt on economic performance through an unrestricted multivariate vector autoregressive (VAR) model. By taking into account the previous data of other variables within the system, as well as their lags, the model illustrates fluctuations in a particular variable, such as real GDP or household debt. VAR models are dynamic simultaneous equation systems that do not have prior restrictions on the model's structure (Brooks, 2008). If the variables are cointegrated I (0) then a basic unrestricted model is applied. Cointegration of I (1) in variables leads to the use of the restricted VAR (VECM), while mixed levels of cointegration lead to the employment of the Toda Yamamoto model.

Due to the level of different cointegration orders in the series in this study, we employ the Toda Yamamoto (TY) which is an unrestricted VAR. The TY framework is fitting for analysing the relationship between economic growth and household debt, because it can be used irrespective of whether the VARs exhibit stationarity around a deterministic trend or integration of any order. Toda and Yamamoto (1995) advocated a VAR model in levels to be utilized to examine linear or nonlinear constraints on coefficients, without significant regard for the integration and cointegration attributes in the time series data.

To apply the TY procedure, the VAR model is augmented with lags of the series. The TY model (Toda & Yamamoto, 1995) requires estimating a VAR model with (k+dmax) lags, where k is the lag length and dmax is the highest order of integration of the variables used in the model. The equations below illustrate the mechanisms of the TY model:

$$EG_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j} EG_{t-j} + \sum_{i=1}^{k} \emptyset_{1i} HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j} HD_{t-j} + \sum_{i=1}^{k} \varphi_{1i} DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j} DSR + \sum_{i=1}^{k} \delta_{1i} ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j} ML_{t-j} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.6$$

$$HD_t = \emptyset_0 + \sum_{i=1}^{k} \emptyset_{1i} HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j} HD_{t-j} + \sum_{i=1}^{k} \beta_{1i} EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j} EG_{t-j} + \sum_{i=1}^{k} \varphi_{1i} DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j} DSR + \sum_{i=1}^{k} \delta_{1i} ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j} ML_{t-j} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.7$$

$$DSR_t = \varphi_0 + \sum_{i=1}^{k} \varphi_{1i}\, DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j}\, DSR \sum_{i=1}^{k} \beta_{1i}\, EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, EG_{t-j}$$
$$+ \sum_{i=1}^{k} \emptyset_{1i}\, HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j}\, HD_{t-j} + \sum_{i=1}^{k} \delta_{1i}\, ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j}\, ML_{t-j}$$
$$+ \ \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .4.8$$

$$ML_t = \delta_0 + \sum_{i=1}^{k} \delta_{1i}\, ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j}\, ML_{t-j} + \sum_{i=1}^{k} \beta_{1i}\, EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, EG_{t-j}$$
$$+ \sum_{i=1}^{k} \emptyset_{1i}\, HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j}\, HD_{t-j} + \sum_{i=1}^{k} \varphi_{1i}\, DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j}\, DSR$$
$$+ \ \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .4.9$$

Equations 4.6 to 4.9 depict that the response variable is determined by the lags of the same variable, together with the lags of endogenous and exogenous variables in the system. Specifically, Equation 4.2 demonstrates that the economic growth variable determined by its lags, the lags of HD, DSR, ML and the exogenous variables. Compactly equations 4.4 to 4.8 can be written as:

$$Y_t = \textstyle\sum_{i=1}^{k} A_i\, Y_{t-1} + BX_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.10$$

where Y_t and X_t are vectors of endogenous and exogenous variables respectively. A_i and B are the coefficient matrices, and k is the optimal order of lags. In this study's TY model, endogenous variables vector, Y_t is presented as:

Y_t = [EG; HD; DSR; ML] ……………………………..…………………4.11

From the graphical (fig 4) analysis of the variable, it is evident that the series are susceptible to structural breaks. This is because the period of interest in this study was affected by major happenings such as the COVID 19 epidemic. Not including these breaks in the estimations will yield biased results (Fasanya *et al.*, 2021[a]). To capture the impact of these breaks dummy variables representing each break are included. Modifying equations 4.6 to 4.9 to accommodate breaks gives the following equations:

$$EG_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i}\, EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, EG_{t-j} + \sum_{i=1}^{k} \emptyset_{1i}\, HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j}\, HD_{t-j}$$
$$+ \sum_{i=1}^{k} \varphi_{1i}\, DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j}\, DSR + \sum_{i=1}^{k} \delta_{1i}\, ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j}\, ML_{t-j}$$
$$+ \sum_{r=1}^{s} D_r\, B_{rt} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .4.12$$

$$HD_t = \emptyset_0 + \sum_{i=1}^{k} \emptyset_{1i}\, HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j}\, HD_{t-j} + \sum_{i=1}^{k} \beta_{1i}\, EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, EG_{t-j}$$
$$+ \sum_{i=1}^{k} \varphi_{1i}\, DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j}\, DSR + \sum_{i=1}^{k} \delta_{1i}\, ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j}\, ML_{t-j}$$
$$+ \sum_{r=1}^{s} D_r\, B_{rt} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .4.13$$

$$DSR_t = \varphi_0 + \sum_{i=1}^{k} \varphi_{1i}\, DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j}\, DSR \sum_{i=1}^{k} \beta_{1i}\, EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, EG_{t-j}$$
$$+ \sum_{i=1}^{k} \emptyset_{1i}\, HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j}\, HD_{t-j} + \sum_{i=1}^{k} \delta_{1i}\, ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j}\, ML_{t-j}$$
$$+ \sum_{r=1}^{s} D_r\, B_{rt} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .4.14$$

$$ML_t = \delta_0 + \sum_{i=1}^{k} \delta_{1i}\, ML_{t-i} + \sum_{j=k+1}^{k+dmax} \delta_{2j}\, ML_{t-j} + \sum_{i=1}^{k} \beta_{1i}\, EG_{t-i} + \sum_{j=k+1}^{k+dmax} \beta_{2j}\, EG_{t-j}$$
$$+ \sum_{i=1}^{k} \emptyset_{1i}\, HD_{t-i} + \sum_{j=k+1}^{k+dmax} \emptyset_{2j}\, HD_{t-j} + \sum_{i=1}^{k} \varphi_{1i}\, DSR_{t-i} + \sum_{j=k+1}^{k+dmax} \varphi_{2j}\, DSR$$
$$+ \sum_{r=1}^{s} D_r\, B_{rt} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .4.15$$

In equation 4.12 to 4.15, all the other parameters are as previously defined except for $\sum_{r=1}^{s} D_r\, B_{rt}$, which capture the presence of the dummy variables. D represents the coefficient of the dummy. B_{rt} is the dummy for breaks and is defined as 1 for t >T_b, otherwise B_{rt} = 0. T_b are the dates of the break where r = 1,2,3…… and t represents the period. Interpretation of the model which has dummies that are capturing breaks still follows the same way as the one without breaks.

The most commonly used tools to analyse VARs are impulse response functions (IRFs) and variance decomposition analyses (VDs). VDs provide information on the comparative significance of each shock or innovation to the variables in the VAR model, whereas IRFs allow for an examination of the dynamic reaction of different components of household debt and if the system is stable shocks should gradually fade away. (Farzanegan & Markwardt, 2021).

While IRFs and VDs share similarities, they differ in their approach. VDs measure the proportion of a variable's movements that are attributable to a shock, while IRFs focus on the dynamic response of the variable to a shock. As explained by Salisu (2015), in the short run, a variable's deviation is mostly due to its own shock. However, as time progresses, the influence of lagged variables becomes more pronounced, and the weight of other shocks increases.

4.9. Data

In exploring the relationship of economic growth and the different components of household debt, the TY model is applied to secondary quarterly data from South Africa spanning the period from 2008 Q1 to 2022 Q2. This time period was selected primarily due to the availability of data. Prior to 2008, data for variables ML and DSR were not accessible at high frequencies such as quarterly or monthly. The data was obtained from Quantec, SARB, and FRED websites. Secondary sources were mainly internet-based sources such as journals and research papers.

Table 4.1 Summary of Data

Abbreviation	**Description**	**Unit Of Measurement**	**Source**	**Code**
DSR	Ratio of debt-service cost to disposable income	Ratio	SARB	KBP6289L
EG	GDP Growth by Expenditure in Constant Prices	Percentage	FRED	NAEXKP01ZAQ657S
HD	Household debt to disposable income of households	Ratio	SARB	KBP6525L
ML	Mortgage loans granted to households (Quarter on Quarter change)	Percentage	Quantec	NCR-D1014-NNP

CHAPTER 5

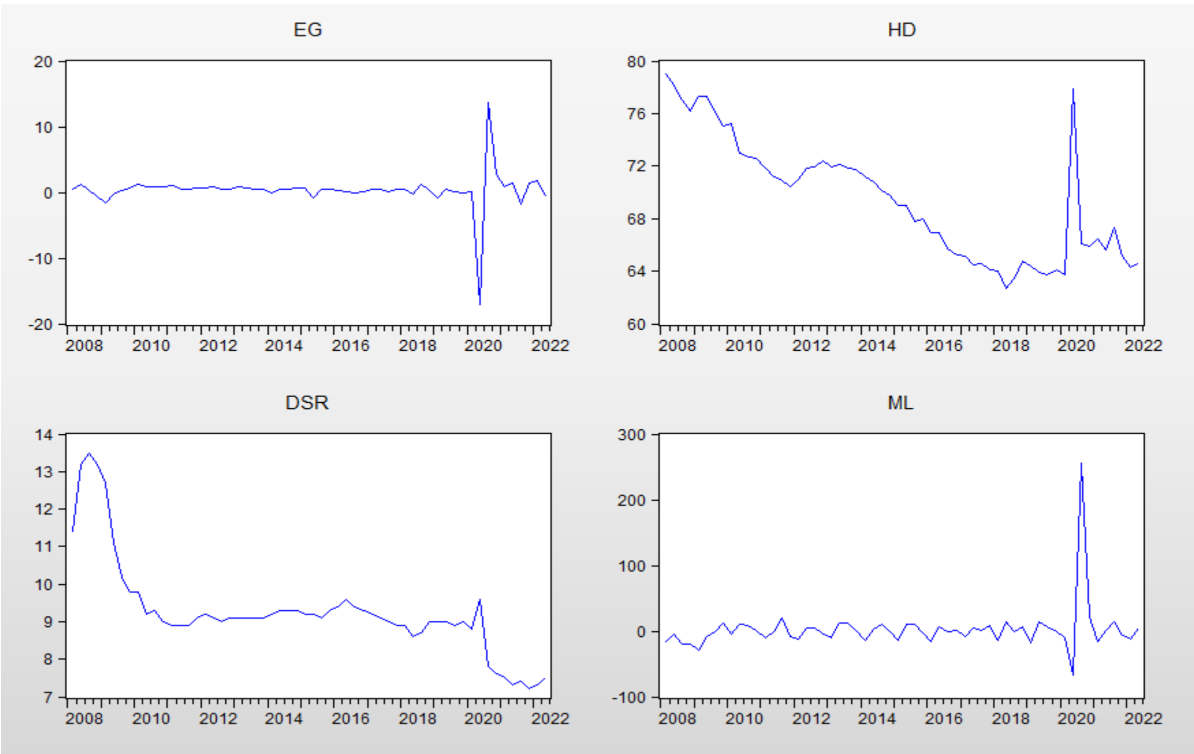
RESULTS AND INTERPRETATION

The preceding section described the methodology employed in implementing the TY model, including the type and origin of the data used. The current section will take the next step and show the results obtained from running the model of the study. The diagnostic process conducted and the properties of the series will also be analysed and presented.

5.1. Descriptive Statistics

To get an initial understanding and some sense of the data the descriptive properties of the data are analysed. The visual property of the variables is presented in Fig 4. The graphs suggest that the series may be infested by structural breaks. Table 5.1 presents the summary statistic of variables used in this study. Over the study period, South Africa has averaged economic growth of 0.34%, reaching an all-time high of 13.8% in the third quarter of 2020, this was preceded by an all-time lowest of 17% in the second quarter of 2020. These statistics correspond to the slump and recovery of the economy during the COVID-19 pandemic shutdown and reopening

Fig 4 Graphical presentation of variables



of the economy. The mean value of HD is 69 % during the study period. The highest level of debt held by households as a ratio of household income is 79% and the lowest is 62.7% over the study period. The average change of mortgage loans is 2.3%. just like EG, ML reached an all-time of 256% increase in 2020 quarter three, after experiencing a decline of 67% in the previous quarter of the same accounting year. The cost of servicing debt has an average of 9.2% over the study time frame. The highest percentage households had to pay for servicing debt was 13.5% and the lowest was 7.2%. Table 5.1 also presents values for Kurtosis. Kurtosis is the measure of the tailedness of a distribution. It shows how often outliers occur in the series

Table 5.1 Descriptive statistics

	EG	HD	DSR	ML
Mean	0.335	69.402	9.274	2.305
Std. Dev.	3.003	4.630	1.321	36.747
Skewness	-1.878	0.388	1.555	5.685
Kurtosis	27.428	2.019	6.201	40.96
Jarque-Bera	*1476.191	3.785	*48.105	*3794.76
Observations	58	58	58	58

Source: Authors' own computations

Note: * significant @ 5% level of significance

under consideration. Kurtosis can be mesokurtic (medium tail), leptokurtic (fat tail) and platykurtic (thin tail.) HD is therefore platykurtic and EG, DSR and ML are leptokurtic. Skewness of the distribution of the series used in the analysis was also considered. From Table 5.1 ML is the most skewed while HD is the least skewed. To gain insight in the nature of general relationships among variables, correlation matrix was erected. A correlation matrix shows linear relationships among the variables. The correlation results are tabulated in table 5.2. From table 5.2, it can be seen that EG has a negative linear relationship with HD and DSR, while it exhibits a positive relationship with ML. When HD and DSR are increasing EG will be falling. On the other hand, ML and EG tend to increase and decrease at the same time.

Table 5.2 Correlation matrix

	EG	**HD**	**DSR**	**ML**
EG	1			
HD	-0.249	1		

DSR	-0.175	0.693	1	
ML	0.746	-0.219	-0.272	1

Source: Authors' own computations

5.2. Unit Root Tests

The unit root tests were conducted using the ADF & PP tests for the standard unit roots. For unit root with structural breaks ADF with structural breaks test was applied. The tests results are presented on table 5.1. The ADF test, used AIC as the automatic lag selection criteria, which is reported in the lags column and the PP test used the new west bandwidth.

The table shows that using ADF tests EG and ML are both cointegrated of order I (0), while order of cointegration for DSR and HD is I (1). However, using the PP test EG, HD and ML are all stationary at 5% & 10% levels of significance in levels. The ADF test and the PP test both confirm that the series has different levels of cointegration. The unit root with structural breaks confirmed the existence of structural breaks and also reinforces that the series have different orders of cointegration. The maximum level of cointegration from all tests is confirmed to be I (1).

Table 5.3 Unit Root Tests

Unit root without structural breaks							Unit root with structural breaks			
ADF				PP			ADF with Structural breaks			
Series	Level	1st Diff	I(d)	Level	1st Diff	I(d)	Break date	Level	1st Diff	I(d)
EG	-7.761*b	-	I(0)	19.479**n	-	I(0)	2010 Q4	-10.888*	-	I(0)
HD	-2.901***	-8.189*b	I(1)	-4.553**b	-	I(0)	2014 Q4	-4.397**	-12.095*	I(1)
DSR	-3.393	-7.776**b	I(1)	-2.236	-18.95*b	I(1)	2009 Q1	-5.204**	-8.751*	I(1)
ML	-8.826**a	-	I(0)	-8.826*b	-	I(0)	2021 Q1	-8.949	-	I(0)

Source: Authors' own computations.

Note: *, ** and *** imply statistical significance at 1%, 5% and 10% levels respectively. Also, *a* denotes model with constant and *b* model with constant and trend

5.3. Lag Length Estimates

The results of the lag length test are tabulated in table 5.4. Two lags are suggested by the FPE, HQ, and the LR. SIC suggests one lag while AIC suggests five lags. SIC is reliably stable and AIC is not consistent but is generally more efficient. According to Brooks (2008), the Schwarz

Table 5.4 Lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-821.633	NA	7267648.	31.755	31.905	31.813
1	-649.534	311.102	1798032.	25.751	26.502*	26.039
2	-620.254	48.425*	1091545.*	25.241	26.591	25.758*
3	-606.204	21.074	1211472.	25.315	27.267	26.064
4	-591.519	19.767	1348208.	25.366	27.918	26.344
5	-571.955	23.327	1293227.	25.229*	28.385	26.437
6	-556.532	16.016	1537161.	25.254	29.003	26.689

* 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
SIC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Authors' own computations

information criterion (SIC) is expected to provide the correct model order in the long run, whereas the Akaike information criterion (AIC) may lead to a model that is too large, even with an infinite amount of data. However, the selection of model orders from different samples within the same population is likely to have more variation when using SIC compared to AIC. Therefore, there is no clear superiority of one criterion over the other. To supplement this selection criterion autocorrelation at each lag was checked. The autocorrelation tests could not reject the null hypothesis of no autocorrelation at lags 2,8, 9, 10, 11, and 12. Therefore these lags are free of autocorrelation. Motivated by the lag criteria selection results and the autocorrelation results at every lag, two lags are therefore chosen as recommended by the HQ lag selection criteria.

5.5. Cointegration Estimates

Table 5.5. Johansen cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.496	93.464	47.856	0.0000
At most 1 *	0.444	55.798	29.797	0.0000
At most 2 *	0.293	23.517	15.495	0.0025
At most 3 *	0.077	4.423	3.841	0.0355

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.496	37.666	27.584	0.0018
At most 1 *	0.444	32.281	21.132	0.0009
At most 2 *	0.293	19.094	14.265	0.0080
At most 3	0.077	4.423	3.841	0.0355

* denotes rejection of the hypothesis at the 0.05 level

Source: Authors' own computations

Table 5.6 presents the results of the cointegration test, which shows that the null hypothesis of no cointegration is rejected based on both test statistics. The trace test recommends that there are four cointegrating equations, while the eigenvalue test proposes that there are three cointegrating equations, both at a significance level of 5%. Table 5.7 displays the normalized cointegration results, where the variables are normalized on EG. Thus in the normalised cointegration table 5.7 EG is dependent on the household debt components thus it takes the value of a unit. In the long run, EG is negatively impacted by DSR and ML, while it is positively impacted by HD ceteris paribus.

Table 5.6 Normalized cointegration coefficients

EG	HD	DSR	ML
1.000	-0.066 [0.182]	0.527 [3.092]	0.037 [4.245]

[ ] T–statistics

Source: Authors' own computations

5.5 Diagnostics Test

Guided by the teachings of Salisu (2015), and the studies of Toda and Yamamoto (1994); Moftah and Dilek (2021) and Dristaki (2017), this result is difficult to interpret and has no economic meaning. Interpretation of these results is therefore pointless, however the results guide and lead into the estimation of causality tests, variance decomposition and impulse responses. The autocorrelation results are presented in Table 5.8. This autocorrelation test aims to examine the null hypothesis of no autocorrelation at every lag. As per the table, the null hypothesis is not rejected, indicating that the model is robust and the obtained results can be trusted for further estimations and inferences.

5.7 Toda Yamamoto Autocorrelation (diagnostics tests)

VAR Residual Serial Correlation LM Tests		
Null Hypothesis: no serial correlation at lag order h		
Lags	LM-Stat	Prob
1	33.848	0.076
2	18.719	0.284
3	25.100	0.068
4	37.818	0.130
5	9.561	0.889
6	24.532	0.079
7	22.963	0.115
8	25.604	0.060
9	19.684	0.235
10	18.128	0.317
11	17.685	0.343
12	24.193	0.086

Source: Author's own computations

5.6. Toda Yamamoto Causality test

Table 5.8 reports the results of the Granger Causality test using the TY method. The test's degrees of freedom are two which are consistent with the lag length used. The test follows the chi-square distribution.

Table 5.8(a) TY Causality between EG and HD

Dependent variable	Chi-sq	Df	Prob	Decision
EG	10.482	2	0.005	HD Granger cause EG
HD	0.491	2	0.782	EG does not granger cause HD

Table 5.8(b) Toda Yamamoto Causality between EG and DSR

Dependent variable	Chi-sq	df	Prob	Decision
EG	3.388	2	0.1838	DSR does not granger cause EG
DSR	2.149	2	0.3415	EG does not granger cause DSR

Table 5.8(c) Toda Yamamoto Causality between EG and ML

Dependent variable	Chi-sq	Df	Prob	Decision
EG	7.705	2	0.021	ML granger cause EG
ML	7.811	2	0.020	EG granger cause ML

Source: Author's own computations

Based on the TY Granger causality test results (Table 5.9 (a)), we can reject the null hypothesis that HD does not cause economic growth. However, we cannot reject the null hypothesis that economic growth does not cause the ratio of household debt to disposable income. Thus, there is a unidirectional causal relationship, which is consistent with the findings of Mian *et al*. (2017) who argued that the impact of household debt on future growth is non-linear. This is because an increase in debt leads to a reduction in future GDP, while a decrease in debt does not necessarily increase GDP. This relationship suggests that fluctuations in HD may have a significant impact on EG. Thus debt levels of households determine the growth direction of the economy in South Africa. This effect will be analysed using IRFs and VDs in forthcoming sections.

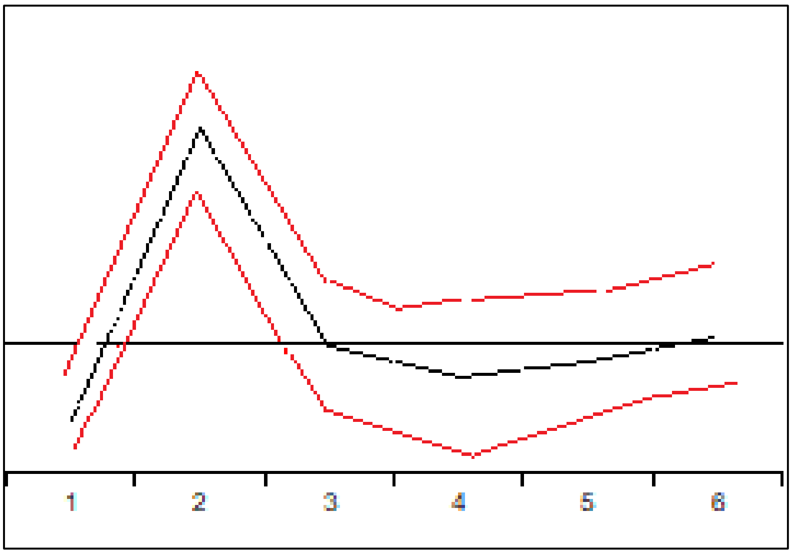
The result shows that the debt service ratio and economic growth have no causal relationship. This result is demonstrated in table 5.9 (b), which indicates that at a 5 percent level of significance, we reject the null hypothesis that the debt service ratio granger causes economic growth, additionally, we reject the null that economic growth granger cause debt service ratio. This may be explained by the fact that most people are not financially literate and the ease of debt accessibility.

According to the results of the TY Granger causality test (Table 5.9 (c)), we can reject the null hypothesis of no causality in both directions between mortgage loans and economic growth at a 5% significance level. Therefore, we can conclude that a bi-directional causal relationship between mortgage loans and economic growth exists. The economic significance of a bidirectional causal relationship between mortgage loans and economic growth is that it can lead to a self-reinforcing cycle of growth. Mortgage loans can stimulate economic growth. When people can purchase homes or invest in real estate, it can stimulate economic activity in related sectors such as construction, home furnishings, and home improvement. This can lead to job creation, increased consumer spending, and an overall boost to the economy. On the other hand, economic growth can increase demand for mortgage loans. As the economy grows and incomes rise, more people may be able to afford to purchase homes or invest in real estate. This can lead to increased demand for mortgage loans, which can in turn stimulate further economic growth.

5.7. Impulse Response

The IRF is a valuable tool for analysing the time dynamics of a shock on the expected future values of variables in a dynamic system. In this study, the IRF is used to trace and understand the response of economic growth (EG) to a one standard deviation increase in household debt components. The IRF is accompanied by 68% confidence intervals or one standard deviation bands, which are constructed using 1000 Monte Carlo simulations. These bands are presented as red dotted lines. The black dotted line between the dotted red lines show the response of economic growth to the shock in household debt. The use of IRFs in this study allows for a deeper understanding of the relationship between household debt and economic growth and provides insight into the time dynamics of shocks. According to Farzanegan (2012) and Fasanya (2021[a]), when the horizontal solid black line in the IRFs falls between confidence bands, the impulse responses are not statistically significant. The horizontal axis in IRFs show the time period after the initial shock. The vertical axis in IRFs shows the magnitude of response to shocks.

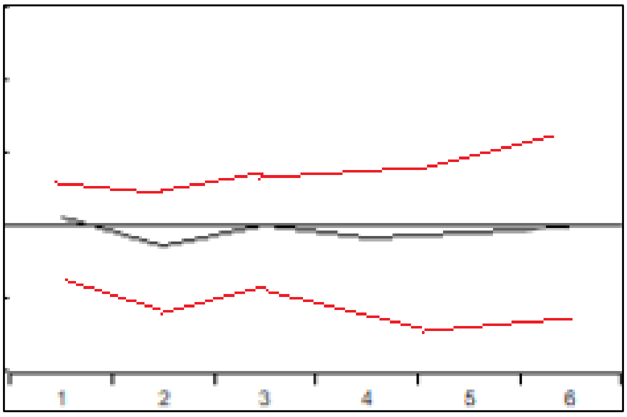
Fig 5. IRF of EG to one standard deviation shock of HD



Source: Authors' own computation

Fig 5 shows the impulse response over 6 years of EG to a one standard deviation shock in HD. The response of EG to innovations in HD is statistically significant in the first and second periods. Using the illustration in fig 5 one standard deviation shock to HD, results in an immediate short-term sharp positive response followed by an equally sharp decline in economic growth. This emphasises the positive short-run relationship between EG and HD. An increase in the level of household debt fuels up consumption in the short run and eventually starts to be a drag on the growth of the economy in the long run confirming the results of Berisha and Meszaros (2018) whose study showed that debt-driven consumption is associated with future declines in the rate of consumption. When the economy is in a negative shock household incomes are reduced. Households then supplement this income using debt to boost their current level of consumption thereby boosting economic growth. By the sixth year, the response of EG to innovations on HD becomes negligible and insignificant. This is contra to theory, which expects that in the long term a high rate of household debt to income ratio to be an anchor that pulls down economic growth.

Fig 6 IRF of EG to one standard deviation shock of DSR

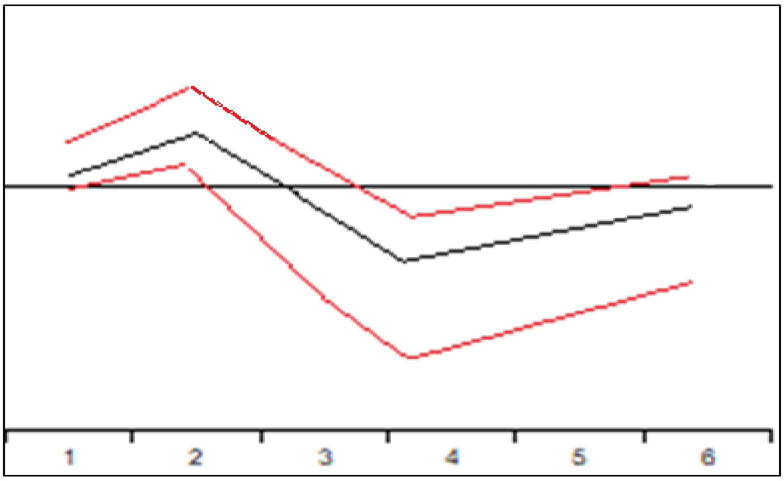


Source: Authors' own computation.

Fig 6 shows the response of EG to one standard deviation of DSR. The effects of debt service ratio are barely negligible throughout the forecast period and they are predominantly negative. This confirms the causality results that there is no relationship between economic growth and debt service ratio in South Africa. This is because when the cost of servicing debt increase households tends to reduce their level of debt-funded consumption dampening prospects of aggregate demand and consequently reducing economic growth. The response of EG to shocks on DSR is statistically insignificant. This suggests that changes in cost of servicing debt are not influential in dictating the direction of the economy. Households are insensitive to debt service costs.

Fig 7 shows that initially, in the first, second, and third periods EG has a positive response to a one standard deviation shock on ML. From the fourth period, a negative response is visible up to the sixth periods. Overall, the response of EG to one standard deviation shock on ML is significant. Economic growth response to innovations in mortgage loans is positive in the short run and negative in the long run. This was expected as evidence showed that mortgage loans constitute more than 50% of household loans, and in theory increase in debt leads to an increase in consumption in the short run and then eventually negatively impact consumption as households repay those loans. The linkages of mortgage loans to the broader economy may be useful to explaining why it affects economic growth. Mortgage loans infiltrate into other industries increasing economic activity and aggregate expenditure.

Fig 7 IRF of EG to one standard deviation of ML



Source: Authors' own computations

5.8. Variance Decomposition

Variance decomposition forms an important section of structural analysis. It separates and allocates the variance of the forecast error into the contributions from specific exogenous shocks. Innately, there is value in understanding that procedure because the results reveal how important a shock is in elucidating the variations of the variables in the model. VDs help isolate which shocks may be insignificant for variations in the short run but may have an essential impact on long-term fluctuations.

Table 5.9 tabulates the various influence of the variable in explaining the variations in economic growth. In the first period, economic growth is fully explained by itself. Most probably because of adaptive expectations. As economic growth changes in the current period, households will then adjust their consumption behaviour and it will reflect in the subsequent period when households fully incorporate that information in decision-making. From the following year, the influence of HD, DSR & ML becomes visible. HD bears the greatest impact in comparison with other variables. In the second year HD explains about 4.7% of EG, and that influence grows to a maximum of 6.72% in a ten-year period. Mortgage loans account for only 1.8% of variations in economic growth in the first year, the influence rose to 2,58% in the sixth year and thereafter it barely rises again. DSR has the least influence in explaining variations in economic growth. At most, it accounts for 0.38% of variations in economic growth. From the third year, the impact of the influence of DSR becomes stagnant, implying that it is mainly a short-run phenomenon. Overall, the combined effects of household debt account for about 10% of variations in economic growth fluctuations and after the sixth year the system becomes stable.

Table 5.9 Variance Decomposition Analysis of EG

Period Ahead	% due to EG	% due to HD	% due to DSR	% due to ML
1	100.000	0.000	0.000	0.000
2	93.218	4.706	0.225	1.852
3	91.341	6.408	0.381	1.870
5	90.562	6.490	0.372	2.576
8	90.248	6.724	0.377	2.651
10	90.231	6.727	0.380	2.663

The causality results suggest a bidirectional relationship between ML and EG. Table 5.10 illustrates the influence of the other variables on ML and confirms that EG has a strong influence on ML. In the first period EG influence ML up to 69% and that influence remains vigorous until the 10th period. In the 10th period EG influence on ML is 37% which is still high.

The influence of EG on HD is tabulated on table 5.11. In the first period the influence of EG on HD is 0%, and gradually increases to a max of 2% in the 10th period. The results show that EG influence on HD is minimal and suggest that households credit consumption decisions are barely influenced by EG but by other factors. This alludes with the result from TY causality test that there is a unidirectional relationship between EG and HD. However, the influence of HD on EG is evident and significant. Thus changes in EG will not significantly affect HD, however changes in HD will have a significant impact on EG. This may imply that, in the short run, high levels of household debt can reduce consumer spending, which accounts for a significant portion of GDP. As the burden of debt increase, households may be less likely to spend on discretionary items, which can lead to decreased demand for goods and services, and ultimately, lower economic growth. Additionally, high levels of household debt can increase the likelihood of default and foreclosure, which can lead to a decrease in housing prices and a decline in construction activity. This can further reduce consumer spending and negatively impact GDP. In the long run, high levels of household debt can lead to lower levels of investment and innovation. When households are burdened with debt, they may be less likely to invest in education or entrepreneurship, resulting in a less productive economy. Furthermore, high levels of household debt can lead to financial instability and increase the risk of economic crises. This can cause a significant reduction in GDP, as seen during the 2008 financial crisis.

Table 5.10 Variance Decomposition Analysis of ML

Period	% due to EG	% due to ML	% due to HD	% due to DSR
1	69.71711	29.56532	0.717570	0.000000
2	62.13733	33.48774	4.330878	0.044053
3	57.49536	30.81583	10.67455	1.014256
5	51.77705	27.35409	17.04909	3.819766
8	41.41292	22.68129	26.58950	9.316295
10	37.19130	21.36806	29.66173	11.77890

Source: Owners computations

Table 5.11 Variance decomposition on HD

Period	% Due to EG	% due to HD	% due to ML	% due to DSR
1	0.000000	85.11477	14.88523	0.000000
2	1.594077	84.68121	13.54046	0.184255
3	1.903067	84.05114	13.78564	0.260150
5	1.696379	84.57738	13.52611	0.200128
8	1.899965	84.39677	13.54801	0.155261
10	2.001088	84.25801	13.61067	0.130230

Source: Author’s own computations.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study was aimed at investigating the dynamics of economic performance and household debt components, including household debt to income ratio, debt service ratio, and mortgage loans in South Africa. The analysis accounted for potential structural breaks resulting from major economic events during the study period. The Granger causality test, impulse response functions (IRFs), and variance decomposition (VD) were used to trace the effects of shocks on economic growth using quarterly data from 2008 Q1 to 2022 Q2.

The study began with a description of the structure and composition of household debt in South Africa, highlighting rising debt to income ratio and debt servicing costs. The study found that a significant proportion of households in South Africa were in debt. One of the objectives of the study was to examine the causal relationship between economic growth and household debt. The TY Granger causality test revealed a unidirectional causal relationship between economic growth and household debt, and a bidirectional causal relationship between economic growth and mortgage loans. However, there was no causal relationship between economic growth and debt service ratio.

To further analyse the macroeconomic implications of household debt in South Africa, IRFs and VDs were employed. The results of the IRFs and VDs emphasized the extend of importance of household debt to income ratio, debt service ratio, and mortgage loans in explaining economic growth. In the short term, household-debt-to-income ratio and mortgage loans trigger a positive response and are significant. Nonetheless in the long run only mortgage loans are significant but leads to a negative response on economic growth. Debt service ratio has very negligible, predominantly and permanently negative influence on the growth of the economy. All in all, debt by households account for variations of the economy's' growth by up to 10% as shown by the VD analysis. EG has insignificant effect on HD and DSR

6.2. Policy Recommendations

The household debt to disposable income ratio plays a crucial role in formulating debt policies in South Africa. According to both IRFs and VDs, household debt to disposable income are important for both short and long term planning. Household debt to disposable income has the highest contribution to variations in economic growth. Although an increase in household debt may lead to short-term economic growth, excessive levels of household debt can make the economy vulnerable to long-term stagnation, since IRFs show a negative relationship in the long run.

The causal relationship between mortgage loans and economic growth suggests that policies on mortgage loans can be used to influence economic growth positively. Policies that encourage households to take out more mortgage loans can have a ripple effect on other industries, such as retail, real estate, and construction, and thus, boost economic growth. This approach can address multiple goals such as eradicating unemployment, reducing inequality and improving housing conditions with a single policy.

Interestingly, the study's results from the Granger Causality test and IRF suggest that debt servicing ratio has no effect on economic growth. Theoretically, the debt overhang model predicts that debt servicing will lead to decreased economic growth as households use most of their income to service debt rather than for consumption, ultimately resulting in defaults and high losses to financial institutions. However, the debt servicing ratio does not seem to have a significant impact on economic growth in South Africa, as it is not yet high enough to cause debt overhang. Thus, policymakers need not worry about the possibility of experiencing debt overhang in the near future.

6.3. Limitations of the study

Data-related issues are the major limitation to the study. Data for all the types of household debt such as developmental loans which is not available in high frequency would be particularly useful. Currently, data used in this study only exists for the most recent decade. A broader coverage would permit a deeper characterisation of the linkages between household debt and economic growth. Such an analysis would potentially be useful for policy.

REFERENCES

Albuquerque, B. & Green, G. (2022), Financial Concerns and the Marginal Propensity to Consume in COVID Times: Evidence from UK Survey Data Working Paper No. WP/22/27

Berisha, E. & Meszaros, J. (2018). Household Debt, Consumption, and Income Inequality. International Economic Journal. Vol, 32. pp 1-16.

Barba, A. and Pivetti, M. (2008*). Rising household debt: Its causes and macroeconomic implications – a long period analysis*. Cambridge Journal of Economics, 33, pp. 113-137

Barnes, S., & Young, G. (2003). The rise in US household debt: Assessing its causes and sustainability, Bank of England Working Paper No. 206.

Beaumont. C., Cui. L., Mercereau. B, & Di Giovanni. J. 2005. New Zealand selected issues. International Monetary Fund. Available: https://www.imf.org/external/pubs/ft/scr/2005/cr05153.pdf . [Accessed: 27/02/2023]

Bridges. S. & Disney. R. 2004. Use of credit and arrears on debt among low income families in the United Kingdom. Fiscal studies. Vol 25. No. 1. 231-267

Bosch. A, Clance .M, & Koch. S. (2021). Debt and Consumption Dynamics: A Non-Developed World View Following the Financial Crisis. Working Paper 2021-42. Pp. 1-35.

Brooks, C. 2008. *Introductory Econometrics for Finance*. UK. Cambridge University Press.

Bunn, P. &, Rostom, M. (2014). *Household Debt and Spending*. Bank of England Quarterly Bulletin 2014 Q3. Available: https://www.bankofengland.co.uk/quarterly-bulletin/2014/q3/household-debt-and-spending [Accessed: 27/02/2023]

Cecchetti. G. S., Mohanty M. S, & Zampolli. F. 2011. The real effects of debt. BIS working paper no. 352. Kansas City.

Cloyne, J. S. and Surico, P. (2017), 'Household Debt and the Dynamic Effects of Income Tax Changes', Review of Economic Studies 84(1), pp 45–81.

Coletta, M. De Bonis, R & Piermattei, S. (2019). *Household Debt in OECD Countries: The Role of Supply-Side and Demand-Side Factors*. Social Indicators Research. Vol 143, pp 1185–1217.

Chamberlin, G. & Yeuh, L. 2006. Macroeconomics. UK. Thomson Learning.

Clark. J. and Rees. M. 2012. *South Africans and debt – it's worse than it seems.* [Online].Available: http://www.moneyweb.co.za/archive/south-africans-and-debt-its-worse-than-it-seems/. [Accessed 2 January 2023].

Debelle, G. 2004. *Macroeconomics Implications of rising household debt.* BIS Working Paper 153

Dickey, D.A., Fuller,W.A., 1979. *Distribution of the estimation for autoregressive time series with a unit root.* Journal of the American Statistical Association. Vol 3. pp 23-34.

Dickey, D.A., Fuller, W.A., 1981. *Likelihood ratio statistics for autoregressive time series with a unit root*. Econometrica 49, 1057–1071.

Disney. R., Bridges. S. & Gathergood. J. 2008. *Drivers of Over Indebtedness.* Report to the Department for Business, Enterprise and Regulatory Reform. Available online: https://www.iser.essex.ac.uk/research/publications/publication-513423 . Accessed: 27/02/2023

Drehmann, M., Illes. A., Juselius. & Santos, M. (2015), "How much income is used for debt payments? A new database for debt service ratios", BIS Quarterly Review, September, pp 89–103.

Dristaki. C. (2017). *Toda-Yamamoto Causality Test between Inflation and Nominal Interest Rates: Evidence from Three Countries of Europe.* International Journal of Economics and Financial Issues. Vol 7. Issue (6). pp 120-129.

Duesenberry, J. S. 1949. *Income, Saving and the Theory of Consumer Behaviour,* Cambridge MA,Harvard University Press

Dunis, C.L., Ho, R., 2005. *Cointegration Portfolios of European Equities for Index Tracking and Market Neutral Strategies*. Liverpool John Moores University and Centre for International Banking, Economics and Finance. Vol 1. pp 451- 462

Dwivide, D.N. (2010). Macroeconomic: theory and policy. New Delhi: Tata McGraw Hill Education Pte Ltd.

Farzanegan, M. R. (2012). *Military spending and economic growth: The case of Iran,* Defence and Peace Economics. Vol 1. pp 1-23

Farzanegan, M. R. & Markwardt.G. (2021). The effects of oil price shocks on the Iranian economy. Energy Economics Vol 31. 134–151

Fasanya, I, O., Oyewole, J. O., Adekoya, O. B, & Badaru, F. O. (2021). *Oil price and Stock market behaviour in GCC countries: Do asymmetries and structural breaks matter?* Energy Strategy review. Vol 36. pp 1-11

Fasanya, I, O., Oyewole, J. O. &Raheem, O. I. (2021). Oil prices and exchange rate dynamics: How important is the role of asymmetry and structural breaks? Journal of African Economics. vol. 23 (3), pp 638-657

Fatoki, O. (2015). *The causes and consequences of household over-indebtedness in South Africa.* Journal of Social Science, 43(2), pp 97-103.

Fisher, S. 1988. "Recent Developments in Macroeconomics." *Economic Journal* 98 (391): 294–339.

Friedman, M. (1957). *A theory of the consumption function: a study by the National Bureau of Economic Research*. Princeton, NJ: Princeton University.

Granger, C.W.J. (1988). Causality, cointegration, and control. Journal of Economic Dynamics and Control, Vol 12, Issues 2–3. pp 551-559.

Hendry, D.F & Juselius, K., 2000. *Explaining cointegration analysis: part I*. Energy Journal. Vol 21, pp. 1–42.

Jacobsen, D. 2005. *What influences the growth of household debt?* Economic Bulletin. No. 04, Q3

Johansen, S. and Juselius, K. 1990. *'Maximum Likelihood Estimation and Inference on Cointegration - with Applications to the Demand for Money.'*, Oxford Bulletin of Economics and Statistics, Vol. 52, No. 2. Pp 84-92

Junkin, K. 2011. *Macroeconomic determinants of stock market behaviour in South Africa.* [Online]. Available: Http://www.scribd.com/doc/133602470/macroeconomic-determinants-f-stock-market-behaviuor-in-South-Africa [Accessed 13 January 2023]

Karambakuwa. R. & Ncwadi. T. (2021). *Determinants of household over-indebtedness in South Africa.* International Journal of Business & Economic Development, Vol. 9 (2). pp 11-24

Kereeditse. M.K. & Mpundu. M. (2021). *Analysis of Household Debt in South Africa Pre- and Post-Low-Quality Asset Financial Crisis*. International Journal of Economics and Financial Issues, 11(5), pp. 114-121.

Keynes, J.M. (1936). *The General Theory of Employment, Interest, and Money.* London: Macmillan.

Kim, J. 2000. *The effects of workplace financial education on personal finances and work outcomes*. Unpublished PhD thesis, Virginia Polytechnic Institute and State University, Blacksburg.

Kim, H. J., Lee. D., Son.J. C. & Son. M. K. 2014. *Household indebtedness in Korea: Its causes and sustainability*. Japan and the World Economy. Volume 29. pp 46-58

Kotze, L. & Smit, A.V.A. 2008. *Personal finances: what is the possible impact on entrepreneurial activity in South Africa*?. Southern Africa Business Review. Vol 12, pp. 3

Kuhn, K. 2010. Note on household wealth in South Africa. *Quarterly Bulletin.* South African Reserve Bank

Kuznets, S. 1952. '*Economic Growth and Income Inequality'*, American Economic Review. Available: http://piketty.pse.ens.fr/files/Kuznets1955.pdf . [Accessed 27/02/2023]

Kwiatkowski, D., Phillips, P.C.B., Schmid, T, P., & Shin, Y., 1992. *Testing the null hypothesis of trend stationarity*. Journal of Econometrics 54, pp. 159–178.

Liu, L., 2007. Consistent Testing for Lag Length in Cointegrated Relationships. (Masters Dissertation, Faculty of Science) Nelson Mandela Metropolitan University, South Africa.

Loutskina & Strahan, 2009. Securitization and the Declining Impact of Bank Finance on Loan Supply: Evidence from Mortgage Originations. Journal of Finance. Volume 64, Issue 2. pp 861–889

Lombardi, M, Mohanty, M & Shim I. (2017): “The real effects of household debt in the short and long run”, BIS Working Paper, no 607.

Lucas, D. J., Goodman L. S, & Fabozzi F. J. 2008. *Collaterized debt obligations and credit risk transfer*. Yale ICF working paper No. 07-06

Lutkelpohl, H. (1993). *Introduction to multiple regression analysis*. Berlin: Springer.

Mankiw, N. G. (2009). Macroeconomics. 6th ed. New York: Worth Publishers.

Mbukanma, I. & Rena, R. (2022). *Household Debt Rate Management in a Credit Economy: An Empirical Review of South African Context.* International Refereed Social Sciences Journal. Vol 13. Issue 01. pp 1-12

Mian, A., Sufi, A, & Verner, E. (2017). *Household debt and business cycles worldwide.* The Quarterly Journal of Economics, Volume 132, Issue 4, Pp 1755–1817

Martins, N., & Villanueva, E. 2003. *The impact of interest-rate subsidies on long-term household debt: Evidence from a large program.* Economics Working Papers 713,

Meniago, C., Petersen, M. J., Petersen, M.A. & Mongale. I. P. 2013. *What causes household debt to increase in South Africa?* Economic modelling 13 vol. 33, Issue C, pp 482-492

Modigliani, F. (1975). “The life-cycle hypothesis of saving twenty years later”, in Michael Parkin, ed., *Contemporary Issues in Economics*, Manchester. Manchester University Press. pp. 2-35.

Modigliani, F. (1986). Life Cycle, *Individual Thrift, and the Wealth of Nations*. The American Economic Review, *76*(3), pp297–313.

Moftah, N.A. & Dilek, S. (2021). *Toda-Yamamoto Causality Test Between Energy Consumption And Economic Growth: Evidence From A Panel Of Middle Eastern Countries*. Journal of Empirical Economics and Social Science Vol: 3. Issue: 1. pp. 56-78

Mutezo, A. 2014, *Household debt and consumption spending in South Africa: an ARDL-bounds testing approach.* Banks and Bank Systems, Volume 9, Issue 4. 9(4). pp73-81

Mutsonziwa, K & Fanta, A. (2019). *Over-indebtedness and its welfare effect on households, Evidence from the Southern African countries.* African Journal of Economic and Management StudiesVol. 10 (2), pp. 185-197

National Credit Act. 2005. *All you need to know about the National Credit Act as a consumer*. National Credit Regulator. Volume 1. Available: https://www.ncr.org.za/documents/pages/1.%20The%20NCR%20(section%2012-23).pdf [Accessed 27/02/2023]

National Credit Regulator (NCR), (2012). *Research on the increase of unsecured personal loans in South Africa’s credit market*: Final report. Available: https://www.ncr.org.za/documents/pages/Annual%20Reports/NCR+ANNUAL+REPORT+2012-13.pdf [Accessed 27/02/2023]

National Credit Regulator. 2014. *Annual report 2014/ 2015*. [Online] Available: http://www.ncr.org.za/documents/pages/Annual%20Reports/NCR%20ANNUAL%20REPORT%202014-15.pdf . [Accessed 12 January 2023]

National Credit Regulator. 2019. *Annual report 2019/ 2020*. [Online] Available: http://www.thedtic.gov.za/wp-content/uploads/NCR_AR_2020.pdf . [Accessed 12 July 2022]

National Credit Report. (2022). Consumer credit market report. Quarter 2. [Online] Available: https://www.ncr.org.za/documents/CCMR/CCMR%202022Q2.pdf [Accessed 12 October 2022]

Nkala P. & Tsegaye A. (2017). *The Relationship between Household Debt and Consumption Spending in South Africa*. Journal of Economics & Behavioral Studies. Vol. 9 (2), pp 243-257

Nomatye, A and Phiri, A. (2017) *Investigating the macroeconomic determinants of household debt in South Africa*. MPRA Paper No. 83303.

OECD (2023), Household debt (indicator). doi: 10.1787/f03b6469-en (Accessed on 01 February 2023)

Paile, K. 2013.*The impact of national credit act on household debt levels in South Afric*a University of Witswaters rand. Available: https://researchspace.ukzn.ac.za/bitstream/handle/10413/16128/Singh_Nishthha_2018.pdf?sequence=1&isAllowed=y [Accessed 26/02/2023]

Pazarbasioglu, C. 2014. *World Economic and Financial Surveys Global Financial Stability Report Moving from Liquidity- to Growth-Driven Markets*. International Monetary Fund. Available: https://www.imf.org/en/Publications/GFSR/Issues/2016/12/31/Moving-from-Liquidity-to-Growth-Driven-Markets [Accessed 11/01/2023]

Philbrick, P., Gustafsson, P., 2010. *Australian Household Debt: An Empirical Investigation into the Determinants of the Rise in the Debt-to-Income Ratio*. (Masters Thesis) Lund University Australia, Australia.

Phillips, R.C.B. &, Perron, P., 1988. Testing for a unit root in time series regression. Biometrika 335–346.

Prinsloo, J W. 2002. "*Household debt, wealth and saving"*. Quarterly Bulletin, No. 226,December. Pretoria: South African Reserve Bank.

Saad, W. 2011. *An econometric study of the private consumption function in Lebanon.* International Research Journal of Finance and Economics, 61. pp, 117-134

Salisu. A. A. (2015). *Multivariate Models: Econometrics For Researchers (Module IV).* Centre for Econometric & Allied Research, University of Ibadan.

Samad. K. A., Daud. S. D, & Dali. N. (2020). *Determinants of household debt in emerging economies: A macro panel analysis,* Cogent Business & Management, Vol 7. Issue 1. pp, 1-14

Schwarz, G., 1978. *Estimating the dimension of a model*. The Annals of Statistics Vol. 6, pp, 461–464.
Sorensen. P. B. & Jacobsen, H. J. W. 2005. *Introducing Advanced Macroeconomics: Growth and Business Cycles*. 2nd Edition. UK. Learning Centre.

Seane, S., Mah, G, & Saah, P. (2016). Risk, opportunities and reasons of the household debt changes: The case of an emerging economy. Risk Governance and Control: Financial Markets & Institutions. *Vol. 6. 1.* Pp 207-215

Thornley, M. (2008). *How New Zealand's non-mortgage individual and household debt has grown since the 1990's looking at the demographic factors behind the debt and how it compares to other OECD countries* (Masters thesis). [Online] Available: http://hdl.handle.net/10292/670 [Accessed 27 October 2022]

Toda. H. Y & Yamamoto. T. (1995). *Statistical inference in vector autoregressions with possibly integrated processes*. Journal of Econometrics. Vol, 66. pp 225-250

World Bank. (2023) World Bank national accounts data, and OECD National Accounts data files. Available on: https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG?end=2021&locations=ZA&start=1999 [Accessed on 16/05/2023]

Young-Sik, J. 2009. *Rising household debt: A problem?* Samsung economic research forum. Monthly focus No. 8. pp 1-11