"Household debt and consumption spending in South Africa: an ARDL-bounds testing approach"

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Household debt and consumption spending in South Africa: an ARDL-bounds testing approach

Abstract

While countries in the developed world have experienced a drop in household consumption post the global financial crisis, South Africa's household debt has been growing rapidly as credit uptake continues to be on the increase. At the same time, increasing borrowing to finance consumption is seen as a stimulating factor for the economy. However, there is concern that high levels of debt may curtail spending in the future and hence in the long-run slow down economic growth. Using the ARDL-bounds testing procedure, the study examines the relationship between household debt and consumption spending in South Africa for the period of 1986-2013 in order to capture the short-run and long-run dynamics. The empirical results show that there is a significant deterministic relationship between household debt and disposable income, net wealth and inflation. No significant short-run relationship exists between debt and the interest rate variable. There is further evidence of the existence of a long-run relationship between household debt and disposable income, interest rate and inflation. The implication of the study is that the low interest rates during the period (2004-2011) and a general increase in household income have supported household consumption expenditure in South Africa thereby sustaining high household indebtedness.

Keywords: credit consumption, household debt, disposable income, ARDL-bounds testing approach, South Africa.
JEL Classification: D12, E21.

Introduction

Household debt has grown considerably in both developed and emerging economies in the last two decades. This has sustained consumption growth and consequently contributed to the decline in household savings (Barba and Pivetti, 2009). While the developed countries have experienced a drop in household consumption post the global financial crisis (Žnuderl, O'Toole and O'Connell, 2012), South Africa's household debt has been growing rapidly as credit uptake continues to be on the increase. According to the National Credit Regulator (NCR) (2012), consumer lending in the form of unsecured loans and credit card advances has increased in recent years fuelling the growth of household debt in South Africa. Furthermore, the substantial decline in interest rates since 2001 has reduced interest payments on mortgage loans which account for the bulk of the household debt-service payments in South Africa (Marcus, 2012).

The aggregate household debt in South Africa has continued to increase over the past two decades especially among the rising black middle class (Cronje and Roux, 2010). This is affirmed by the governor of the Central Bank of South Africa (SARB), who expressed growing concern regarding the unwarranted levels of household debt in relation to the disposable income ratio (Marcus, 2012). As such, the process of credit provision has been under the spotlight for some time. The Central Bank has therefore cut the repurchase (repo) rate following what was termed "an accommodative monetary policy stance". The policy approach taken by the Central Bank was explained as being a means of assisting in the reduction of debt rather than being a process to initiate further consumer spending (Hoosain, 2012). Households use credit to fund purchases of durable consumer goods and services, and they use it to bridge temporary drops in income, for instance over the business cycle.

In many countries, consumption accounts for more than half of gross domestic product (GDP) (Gerlach-Kirsten, 2013). Consumption directly affects households' living standards and thus is an important measure of wealth (O'Toole, O'Connell and Gerlach-Kirsten, 2013). The socio-economic base of credit usage has expanded tremendously over the last decade. According to Krugman (2007), this recent increase in the use of credit has occurred in tandem with the increase in income inequality. Different types of credit with varying characteristics have become available and, as such, lower and middle-class households have increasingly turned to these financing tools to enjoy consumption opportunities that would not have been available otherwise (Krugman, 2007). Thus generally there has been an increase in the number of credit facilities used in South Africa (NCR, 2012). These facilities include mortgages, collateralized credit such as vehicle finance and unsecured forms of debt such as credit cards, bank overdrafts, store cards and unsecured loans. It is interesting to also note that unsecured lending has seen some of the most spectacular growth rates since the implementation of the National Credit Act (NCA) with loans growing by more than 53% between 2010 and 2011 (NCR, 2012). Unsecured credit transactions include all transactions in respect of which the borrower does not have any security. Unsecured borrowing has risen faster than household disposable income, raising concerns among policy makers. As a result, household spend-

ing has outstripped domestic income, the difference being funded by bank credit (NCR, 2012).

Increasing borrowing to finance consumption is seen as a stimulating factor for the economy (Rajan and Zingales, 2003). However there is concern that high levels of debt may curtail spending in the future and hence, slow down economic growth in the long run. A high debt level therefore implies a higher debt service burden and restricts the ability of households to gain access to additional external funds. A high level of debt raises the households' vulnerability, reducing their ability to adjust to unexpected shock to their income, their assets or interest rates (Martinez-Carrascal and del Rio, 2004).

There is not much academic evidence on the impact of a relatively high level of indebtedness on credit consumption in South Africa. Given that household consumption expenditure accounts for almost 60% of GDP in South Africa, it is important to understand the drivers for household indebtedness. Understanding these drivers of credit consumption has policy implications at both micro and macro-levels. At the micro level the determinants of credit constraints help shed light on the credit granting process.

This paper contributes to the existing body of literature by focusing on the nexus between household debt and credit consumption at aggregate level. Using the Autoregressive Distributed Lag (ARDL)-Bounds test approach, the study seeks to establish the relationship between household debt and credit consumption in South Africa during the period 1986-2013, as well as investigating whether the variables under study are cointegrated in the long-run. The results indicated that there is a long-run relationship between household debt and disposable income, interest rate and inflation.

The rest of the paper proceeds as follows: Section 1 presents the review of literature; Section 2 discusses the empirical literature review; Section 3 presents the results; and the final Section concludes the study.

1. Literature review

This section reviews the empirical work on the relationship between household debt and consumption spending.

1.1. Theoretical framework. As is the case in many economies, credit consumption may be placed as the epicentre of aggregate demand and therefore might play an important role in the art of economic analysis. According to Saad (2011), modern consumption revolves around three models, namely: Keynes' (1936) absolute income hypothesis, Modigliani's (1975) life cycle hypothesis, and Friedman's (1957) permanent income hypothesis (PIH).

Keynesian theory maintains that current household consumption patterns are a function of the current disposable income in a household. However, the theory has been criticized on the grounds that it relates to the use of current as opposed to future potential income. As such, consumption is based on the "fundamental psychological law" which states that on average people are likely to increase their consumption as income increases. Nevertheless, Keynes (1936) postulates that consumption patterns at the time were based on current income. However, today household consumption is believed to be dependent on future income. The central idea conveyed by these models is that households make their consumption choices on the basis of their wealth, current disposable income and future income expectations so as to guarantee a uniform level of consumption over their lifetime.

Modigliani's life cycle hypothesis (LCH) states that consumption by a rational consumer depends on available resources in conjunction with the allocation of income over a longer period of time (Modigliani, 1975). According to Dwivedi (2010), this enhances the principle of maximisation of utility. According to Saad (2011), Modigliani's contribution to life cycle income hypothesis revolves around the fact that consumption is dependent on current income and net wealth. Modigliani asserts that households consider their entire life span when making decisions on how to spend (Saad, 2011). It is argued that consumption is dependent on the position of the individual in the life cycle with the aim of the smoothening consumption over a life time in which income fluctuates substantially depending on age. The ability to do so rests on the premise that consumers do not face credit constraints. In practice consumers may not be able to borrow against expected future income because their ability to borrow may be constrained by their ability to post collateral (Lai & Lam, 2002).

Friedman (1957) developed the permanent income hypothesis (PIH) and is supported by Duesenberry (1948). The theory purports that the level of consumption is dependent upon the income received, but clarifies that this would be in relation to households with which it identified itself with. Duesenberry (1948) further postulates that consumption in relation to income earning could be categorised as "sticky downwards" since households tend to adjust their spending patterns upwards when income increases but are reluctant to do so when the contrary happens. The author refers to this as the "ratchet effect". Furthermore, there are transitory purchases made by households which do not require immediate consumption, yet are attractive for various reasons such as discounted prices (Thornley, 2008). Purchases made from transitory cash include bonus-

es or winnings from lottery tickets or gambling. According to Saad (2011) Friedman's (1957) PIH manifests itself in a combination of both permanent income hypothesis as well as transitory income.

Interest rates tend to reduce aggregate consumption because of the wealth declines associated with the heavier discounting of future income (Bayar and McMorrow, 1999). An increase in interest rates gives rise to rising inflation which makes it difficult for consumers to repay their debts. Higher inflation increases the growth of household consumption and consequently an increase in household debt. The reduction in interest rates both in nominal and real terms, contribute to a significant easing of liquidity constraints on households. In a study of South African households between 1980 and 2005, Aron, Muellbauer and Prinsloo (2007) establish a positive correlation between the real interest rate on borrowing and the debt-to-income ratio. A reduction in interest rate between 2003 and 2005 in South Africa saw a reduction of the debt service ratio fall by 6% in 2004 (Aron et al., 2007). As expected, the amount of credit accessed by all sectors soared significantly until 2006 before reverting to the same low levels that existed prior to 2004 after the interest rate shock (Aron and Muellbauer, 2013).

Thus changes in interest rates have an adverse bearing on the demand for credit/loans. On one hand, there is bound to be a positive effect on the volume of loanable funds provided that a rise in interest rate increases the net income attained by credit institutions. But on the other hand, a credit rationing situation may arise, as indicated by Stiglitz and Weiss (1981) where the financial sector might perceive greater risks associated with an increase in interest rates. Taken as a whole, interest rate increases would appear to reduce aggregate consumption because of the wealth declines associated with heavier discounting of future income.

2. Empirical literature review

A number of studies have been done on the relationship between household debt and consumption spending, but these have mainly focused on developed countries such as the United Kingdom (UK), the United States of America (USA) and Europe. Martinez-Carrascal and Del Rio (2004) investigate the impact of household borrowing and consumption in Spain using a Vector Error Correction Model (VECM) where labor income, wealth variables and nominal interest rates are included. The findings indicate that deviations of borrowing from its long-run trend have a significant impact on consumption: when lending is above (below) its long-run level, future consumption contracts (expands). The results show that both consumption and lending are posi-

tively related to both types of wealth and labor income in the long run, and negatively related to interest rates.

Using data from Greece, Japan, Italy, Spain, Sweden, the United Kingdom and the United States, Japelli and Pagano (1989) did a study based on the excess sensitivity of consumption to income with credit availability. The authors showed that excess sensitivity is higher in countries with lower borrowing, where capital market imperfections might be more important. Given such a scenario, consumption might be influenced by credit availability.

Chrystal and Mizen (2001) explain the consumption of British households using money and unsecured borrowing as variables. A conditional VECM is estimated for consumer expenditure, money balances, and unsecured lending with exogenous variables such as labor income, total net wealth, interest rate spreads and unemployment. Their findings indicate that, in the long-run, consumption is negatively related to unsecured debt while in the short-run deviations of consumption from its long-run equilibrium affect lending positively.

Using US household data, Johnson and Li (2007) investigate the link between household debt service ratio (DSR) and consumption between 1992 and 2005. They find that the consumption of households with low liquidity assets and high DSR is more sensitive to income changes than the consumption of other low liquid asset household.

Past studies on consumption in South Africa tend to focus on income and wealth effects (Aron and Muellbauer, 2006; Aron, Muellbauer and Murphy, 2006). Prinsloo (2002) looked at the trends in household debt, wealth and saving in South Africa between 1975 and 2001. The author contends that the spending and saving behavior of households is determined by factors such as social and material needs, taste, fashion, cultural and traditional beliefs, cost and standard of living, current debt to income ratio and the possibility of a future increase in aggregate income. Chipeta and Mbululu (2012) examined the effects of the national Credit Act and the global financial crisis on domestic extension in South Africa. The authors establish a general increase in the consumer credit provision in the period subsequent to the implementation of the NCA. There was a general increase in the use of credit cards, and other conventional loans.

Using quarterly data in a regression analysis between 2007 and 2012, Aregbeshola (2014) estimates the effects of changes in regulation as regards the rate of consumption and ultimately economic growth in South Africa. The findings indicate that an increase in credit consumption leads to an in-

crease in economic growth. Academic research on the relationship between household debt and credit consumption on an aggregate level in South Africa is lacking, hence this paper aims to fill that gap.

The literature reviewed in this section shows that household debt may be a useful tool in the financial sector and that it can probably enhance consumption spending and ultimately economic growth. All the findings of the literature referred to in this article confirming the usefulness of consumption spending arose from experiences of developed countries. There is therefore a need to test these findings empirically in developing countries like South Africa, hence the focus of this article. The following section tests the linkages between household debt and credit consumption spending variables, taking into consideration macroeconomic factors that influence the uptake of credit by consumers.

3. Data, empirical model specification and estimation techniques

Having examined as part of the study's literature component the potential relationship between household debt and macroeconomic variables, the attention is now focused on the empirical aspects of the investigation of the nature of the relationship between household debt and credit consumption in South Africa.

3.1. Data sources and definition of variables. The study used annual time series data for the period between 1986 and 2013 and all the data used in the research were obtained from the central bank of South Africa. The dependant variable is total household debt. The Debt Service Ratio (DSR) was used as a proxy for household debt. Debt service ratio is that share of household disposable income to required principal and interest payments on household debt such as mortgages, vehicle loans and credit card balances (Johnson and Li, 2007). An increase in DSR may be due to a decline in interest rates or an extension of mortgage and consumer credit to households who could not previously qualify. The explanatory variables are household disposable income and household net wealth. Control variables such as inflation and interest rate were included because they are macro-economic variables which influence the up-take of credit by households.

The cost of financing is proxied by nominal interest rates because credit market conditions are typically related to nominal rather than real interest rates. In this regard, a drop in interest rate will normally lead to an increase in the supply of credit, and could therefore have an influence on consumption (Prinsloo, 2002). A change in interest rate could have an

effect on credit extended to households and this would ultimately influence aggregate demand. Net wealth signifies that consumption by household should reflect their perceptions of the wealth effect; hence households care about their net worth (total assets minus liabilities). In this instance disposable income is defined as income available after income taxes have been accounted for.

Initially the regression model was run to determine the short-run relationship of consumption as measured by household debt and independent variables namely disposable income, net wealth, interest rate and inflation. Then, in an attempt to establish a long-run cointegration relationship between household debt and consumption the auto-regressive distributed lag (ARDL) − Bounds testing approach by Pesaran, Shin and Smith (2001) model was adapted.

3.2. Model specification. The hypothesized model is therefore specified as follows:

$$DSR_t = \beta_0 + \beta_1 HDI + \beta_2 WEALTH + \beta_3 INT + {} + \beta_4 CPI + \varepsilon_t. \tag{1}$$

Where: DSR_t is the debt service ratio which proxies household debt. HDI is the annual household disposable income, $WEALTH$ is net wealth of households, INT is the prime overdraft lending rate per annum, CPI is the consumer price index, ε_t is the white noise error term, $\beta_0 - \beta_4$ are the coefficients explaining the elasticities of explanatory variables. These values are constants determined by available technology.

The first step was to find whether there is a deterministic or short-run relationship between household debt and disposable income, net wealth, interest rate and inflation. The results of the *OLS* are as follows:

Table 1. Results of the deterministic relationship between debt and independent variables

Variable	Coefficient estimates	t-statistic	p-value
HDI	0.000370	2.185080	0.0393*
NETWEALTH	0.153269	3.079797	0.0053**
INT	5.466709	1.466507	0.1561
CPI	7.511182	2.900773	0.0081**

Note: ***, **, * Denotes 1%, 5% and 10% levels of significance.

The results shown above reveal that there is a significant deterministic or short-run relationship between household debt and disposable income, net wealth and inflation. Household debt is directly related to the inflation variable. These results are contrary to the findings of Chipeta and Mbululu (2012) who found the interest rate variable to be statistically significant, indicating that an increase

in interest rates causes household debt to increase. Household net wealth and inflation are significant drivers of household debt at the 5% level while disposable income is significant at the 10% level. There is no significant deterministic relationship between household debt and interest rates.

3.3. Stationarity tests. Although the ARDL modelling approach does not require unit root tests, it is important to conduct the unit root test in order to ensure that no variable is integrated of order 2 [1(2)] or higher. This is critical because the ARDL procedure assumes that all variables are either I (0) or I (1). The data sets of the five variables, namely household debt (DSR), Household disposable income (HDI), net wealth (WEALTH), interest rates (INT), and inflation (CPI) were subjected to unit root tests using the Augmented Dickey-Fuller Schwarz Info Criterion before they were tested for cointegration using ARDL-bounds approach. The results of the stationarity tests on differenced variables are presented in Table 1.

Table 2. Stationarity tests of variables on first difference – Augmented Dickey Fuller (ADF) test

Variable	No trend	Intercept	Trend & Intercept
DDSR	-3.372596 ***	-3.305452 **	-3.386684 **
DHDI	0.533163	-0.842098	-3.432232 *
DWEALTH	-1.322715	-2.577058	-4.414144 ***
DINT	-3.630880***	-3.563456 **	-3.755506 **
DCPI	-4.849574 ***	-4.871104***	-4.854239 ***

Note: ***, **, * Denotes 1%, 5% and 10% levels of significance.

Given the results in the table above, the hypothesis that first difference of household debt, household disposable income, net wealth, interest rate and inflation have unit roots can be rejected. The unit root test results show that all variables are integrated of order one.

3.4. Cointegration test – ARDL-bounds testing procedure. Since the focus of this paper is to establish the relationship between household debt and consumption spending, an appropriate technique is to adopt cointegration analysis and error correction modelling. Therefore, the ARDL modelling approach (i.e. bounds testing approach to cointegration) that was originally introduced by Pesaran and Shin (1999) and later extended by Pesaran, Shin and Smith (2001) was adapted in the study. This approach has some econometric advantages over the Engle-Granger (1987) and the maximum likelihood-based approach proposed by Johansen and Juselius (1990) and Johansen (1991) cointegration techniques. The ARDL approach is unique and superior in that it does not require all the variables under investigation to be integrated at the same order.

Thus, the ARDL approach can be used in a situation even if the regressors are integrated in any order that is order one 1 (1) and zero 1 (0) or mutually integrated (Pesaran and Pesaran, 1997). Laurenceason and Chai (2003) argue that using the ARDL approach avoids problems resulting from non-stationary time series data. Furthermore, endogeneity problems are addressed in this technique. According to Pesaran and Shin (1999), modelling the ARDL with the appropriate lag will correct for both serial correlation and endogeneity problems.

The ARDL framework for the equations 2-9 are as follows:

$$\Delta DSR_t = \mu_0 + \sum_{i=1}^{n}\gamma_{1i}\Delta DSR_{t-i} + \sum_{i=1}^{n}\gamma_{2i}\Delta HDI_{t-i} + \gamma_3 DSR_{t-1} + \\ +\gamma_4 HDI_{t-1} + \varepsilon_t. \quad (2)$$

$$\Delta HDI_t = \kappa_0 + \sum_{i=1}^{n}\varphi_{1i}\Delta HDI_{t-i} + \sum_{i=1}^{n}\varphi_{2i}\Delta DSR_{t-i} + \varphi_3 HDI_{t-1} + \\ +\varphi_4 DSR_{t-1} + \varepsilon_t. \quad (3)$$

$$\Delta DSR_t = R_0 + \sum_{i=1}^{n}\varpi_{1i}\Delta DSR_{t-i} + \sum_{i=1}^{n}\varpi_{2i}\Delta WEALTH_{t-i} + \varpi_3 DSR_{t-1} + \\ +\varpi_4 WEALTH_{t-1} + \varepsilon_t. \quad (4)$$

$$\Delta WEALTH_t = \chi_0 + \sum_{i=1}^{n}\beta_{1i}\Delta WEALTH_{t-i} + \sum_{i=1}^{n}\beta_{2i}\Delta HD_{t-i} + \\ +\beta_3 WEALTH_{t-1} + \beta_4 HD_{t-1} + \varepsilon_t. \quad (5)$$

$$\Delta INT_t = \nu_0 + \sum_{i=1}^{n}\delta_{1i}\Delta INT_{t-i} + \sum_{i=1}^{n}\delta_{2i}\Delta DSR_{t-i} + \delta_3 INT_{t-1} + \\ +\delta_4 DSR_{t-1} + \varepsilon_t. \quad (6)$$

$$\Delta DSR_t = \vartheta_0 + \sum_{i=1}^{n}\sigma_{1i}\Delta DSR_{t-i} + \sum_{i=1}^{n}\sigma_{2i}\Delta CPI_{t-i} + \sigma_3 DSR_{t-1} + \\ +\sigma_4 CPI_{t-1} + \varepsilon_t. \quad (7)$$

$$\Delta CPI_t = \pi_0 + \sum_{i=1}^{n}\tau_{1i}\Delta CPI_{t-i} + \sum_{i=1}^{n}\tau_{2i}\Delta DSR_{t-i} + \tau_3 CPI_{t-1} + \\ +\tau_4 DSR_{t-1} + \varepsilon_t. \quad (8)$$

Where: $DDSR$ – debt service ratio, $DHDI$ – household disposable income, $DWEALTH$ – household, $DINT$ – interest rate, $DCPI$ – inflation, Δ - the first difference operator.

In the above equations, the terms with the summation signs represent the error correction dynamics while the second part (the terms with γ in equation (2), φ in equation (3) ϖ in equation (4), and β in equation (5), ρ in equation (6), δ in equation (7), σ in equation (8) and τ in equation (9) corresponds to the long-run relationship. The null hypotheses in equations 3, 4, 5, 6, 7, 8, 9 and 10 are therefore:

$$\gamma_3 = \gamma_4 = 0, \varphi_3 = \varphi_4 = 0, \varpi_3 = \varpi_4 = 0, \ \beta_3 = \beta_4 = 0, \rho_3 = \rho_4 = 0, \delta_3 = \delta_4 = 0, \sigma_3 = \sigma_4 = 0, \ and \ \tau_3 = \tau_4 = 0. \qquad (9)$$

respectively, which indicate the non-existence of the long run relationship. The first step of the ARDL-bounds testing requires examining the order of lags on the first differenced variables in equations 2, 3, 4, 5, 6, 7, 8 and 9 using the Akaike information criterion (AIC) and the Schwartz-Bayesian criterion (SBC). The results of the AIC and the SBC suggest that optimal lag for DDSR and DHDI is 1, DDSR and DWEALTH is 1, DDSR and DINT is 2, while the optimal lag for DDSR and DCPI is 2. The second step requires one to apply the bounds F-test to equations 2, 3, 4, 5, 6, 7, 8 and 9 in order to determine whether any long-run relationship between household debt and consumption variables exists.

Cointegrated variables ensure that we eliminate spurious relations and as such share common stochastic trends. Further, they enable us to formulate an error correction model as we determine the long-run relationship among variables. We first estimate a restricted VAR and determine the lag-length selection criteria. The optimum lag-length selected is two. The results are presented in Table 2 suggest that there are three cointegrating relationship between variables. The null hypothesis that there is no cointegrating vector is rejected as the trace statistic is greater than the critical value from the Johansen tables. We conclude that there are three cointegrating vectors. Using the maximum eigenvalues we also come to the conclusion that there is one cointegrating relationship.

Table 3. Bounds *F*-test for cointegration

Dependant variable	Function	*F*-test statistic	*p*-value	Conclusion
DSR	DDSR (DHDI)@trend	4.108704	0.0305	Rejected
HDI	DHDI (DDSR)	55.26517	0.0000	Accepted
DDSR	DDSR (DNETWEALTH)	4.303658	0.0258	Inconclusive
WEALTH	DNETWEALTH (DDSR)	2.704329	0.0881	Inconclusive
DDSR	DDSR (DINT)	55.66190	0.0000	Accepted
INT	DINT (DDSR)	4.27513	0.0017	Inconclusive
DDSR	DDSR (DCPI)	6.544795	0.0015	Accepted
CPI	DCPI (DDSR)	0.853194	0.5085	Rejected

Note: Author's compilation.

The results show that there is no evidence of a long-run relationship between household debt and inflation. All other things being equal, consumption is not influenced by inflation in the long run. To determine whether there is a cointegrating relationship between variables, we used Table C1 (5) and Table C1 (2) as per Pesaran et al. (2001, p. 300) model to determine the asymptotic critical value bounds for the *F*-statistic, since the first model had unconstrained intercept and unrestricted trend, and the other models had restricted intercept and no trend respectively. The lower and upper bounds for the F-test statistic at the 10%, 5% and 1% significance levels for household debt and disposable income are [4.19 5.068] [4.87 5.85] [6.34 7.52] respectively. Since the value of the *F*-statistic is less than the lower bound at the 5% significance level in this case, it can be concluded that there is no evidence of a long-run relationship between the two time series at this level of significance or greater. The lower and upper bounds for the F-test statistic at the 10%, 5% and 1% significance levels for DHDI and DDSR are [2.63 3.35] [3.10 3.87] [4.13 5.00]. However, the value of the *F*-statistic is more than the upper bound at the 1% level of significance. Therefore there is evidence of a long-run rela-

tionship between disposable income and debt. The lower and upper bounds for the *F*-test statistic at the 10%, 5% and 1% significance levels for DDSR and WEALTH are [2.63 3.35][3.10 3.87][4.13 5.00] respectively. The value of the F-statistic is within the upper bound at the 5% level of significance indicating an inconclusive long-run relationship. For DWEALTH and DDSR value of the *F*-statistic is within the lower bound at the 10% significance level. Therefore, there is no long-run relationship. For DDSR and DINT and DDSR and DCPI the value of the F-statistic is more than the upper bound of at the 1% level of significance. Therefore, there is evidence of a long-run relationship between household debt and interest rate and household debt and inflation. Therefore, the results indicate evidence of a long-run relationship between household debt and interest rate and inflation and disposable income and household debt.

Discussion and conclusion

In this study, the relationship between household debt and economic variables such as disposable income, net wealth, interest rates and inflation in South Africa is estimated using modern econometric techniques. Specifically, the study attempts to

determine the existence of short-run and long-run relationship between the variables under study, using data from South Africa. Unlike the majority of previous studies who use the vector error correction model (VECM), (Martinez-Carrascal, and del Rio, 2004; Chipeta and Mbululu, 2012; Kim, Setterfield and Mei, 2014), the current study uses the ARDL-Bounds testing approach by Pesaran et al. (2001) to examine this linkage. Using the 1986-2013 dataset, the empirical results of this study show that there is a short-run or deterministic relationship between household debt and disposable income, net wealth and inflation. The results also suggest evidence of the existence of a long-run relationship between household debt and interest rates and inflation.

Literature identifies the possibility of an increase in credit where there is prospect for an increase in household income. The results reported in this study are consistent with the view that household consumption is related to household income in the long-run (Martinez-Carrascal, and del Rio, 2004) and interest rates (Kim, Setterfield and Mei, 2014).

It can be concluded that the increase in household debt in South Africa over the years is partly a process of a structural nature. A combination of such factors as credit liberalization, higher disposable income, low net wealth and periods of low interest rates explain the rising levels of household debt. At the same time, household wealth is negligibly low, indicating low savings and very little investment in assets. The implication of the study is that the low interest rates during the period (2004-

2011) and a general increase in household income have supported household consumption expenditure in South Africa thereby sustaining high household indebtedness.

The sharp increase in household debt and consumption warrants much attention owing to its macroeconomic and financial implications. The concern is two-fold. Higher debt levels lead to higher consumption spending in South Africa. The concern arises during a recessionary period in the economy, when households struggle to contain these high debt levels. Concern is also expressed over consumer behavior, which in the case of South Africa makes a significant contribution to GDP. South African households/consumers are therefore encouraged to spend less and save more. With interest rates being cleverly controlled by the reserve bank in the event of inflation going up, South African households will be burdened by debts that they will not be able to pay, a situation similar to the Greek's.

Implications for further study

While the results are consistent with other empirical studies that used different analytical approach, further research on the causal relationship between household debt and macroeconomic variables used in this study is recommended. Although the regression analysis conducted in this study is able to explain the relationship between the dependent and independent variables, it is considered important to investigate the direction of influence among these variables – hence the granger causality is recommended for further research.

References

1. Arde, A. (2012). "Regulators All At Sea While Consumers Drown in Debt" IOL, March 25. Available online: http://www.iol.co.za/business/personal-finance/banking/regulators-all-at-sea-while-consumers-drown-in-debt-1263000 [Accessed on 23 July, 2013].
2. Aregbeshola, R.A. (2014). Financial Regulation, Credit Consumption and Economic Growth - An Analysis of the National Credit Act in South Africa, *The Journal of Applied Business Research*, 30 (2), pp. 367-378.
3. Aron, J. and Muellbauer, J. (2013). Wealth, Credit Conditions, and Consumption: Evidence from South Africa. *Review of Income and Wealth, 59 (S1):S161-S196.*
4. Aron, J., Muellbauer, J. and Prinsloo, J. (2007). Balance Sheet Estimates for South Africa's household Sector from 1975 to 2005. South African Reserve Bank Working Paper No. WP/01/07. Retrieved from www.resbank.co.za/Lists/News%20and%20Publications/Attachments/3640/Full%20Quarterly%20Bulletin.pdf
5. Aron, J. and Muellbauer, J. (2006). "Estimates of Household Sector Wealth for South Africa, 1970-2003", Review of Income and Wealth, 52 (2), pp. 285-308.
6. Aron, J., Muellbauer, J. and Murphy, A. (2006). Housing Wealth, Credit Conditions and Consumption, MPRA Paper No. 24485.
   Barba, A. and Pivetti, M. (2009). Rising household debt: Its causes and macroeconomic implications – a long period analysis, *Cambridge Journal of Economics*, 33, pp. 113-137.
7. Bayar, A. and McMorrow, K. (1999). Determinants of Private Consumption. Economic Papers, No. 135. European Commission, Directorate General for Economic and Financial Affairs.
8. Chipeta, C and Mbululu, D. (2012). The effects of the National Credit Act and the Global financial crisis on domestic credit extension: Empirical evidence from South Africa, *Journal of Economic and Financial Sciences*, 5 (1), pp. 215-228.
9. Chrystal, K.A. and Mizen, P. (2001). Consumption, money and lending: a joint model for the UK household sector, *Bank of England working papers*, 134, Bank of England.

10. Cronje, A. and Roux, I. (2010). "Savings culture for the black middle class in South Africa", USL Leader's Lab, Vol. 4 (2), pp. 22-27.
11. Duesenberry, J.S. (1948). Income, Saving and the Theory of Consumer Behaviours, Cambridge, MA, Harvard University Press.
12. Dwivedi, D.N. (2010). Macroeconomic: theory and policy. New Delhi: Tata McGraw Hill Education Pte Ltd.
13. Ekici, T. and Dunn, L. (2010). "Credit card Debt and Consumption: Evidence from House-hold level Data", *Journal of Applied Economics*, Vol. 42 (4), pp. 455-462.
14. Engle, R.F. & Granger, C.W.J. (1987). Co-Intergration and Error Correction: Representation, Estimation, and Testing, *Econometrica*, 55 (2), pp. 251-276.
15. Friedman, M. (1957). A theory of the consumption function: a study by the National Bureau of Economic Research. Princeton, NJ: Princeton University.
16. Gerlach-Kristen, P. (2013). *The effect of unemployment, arrears and negative equity on consumption: Ireland in 2009/10.* Papers, Economic and Social Research Institute (ESRI).
17. Hoosain, A. (2012). The relationship between consumer credit and consumption spending in South Africa. Gordon Institute of Business Science, University of Pretoria.
18. Jappelli, T., and Pagano, M. (1994). Saving, growth, and liquidity constraints, *The Quarterly Journal of Economics*, *109* (1), pp. 83-109.
19. 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. 169-210.
20. Johansen, S. (1991). "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica*, Vol. 59, No. 6, pp. 1551-1580.
21. Johnson, K.W. and Li, G. (2007). Do High Debt Payments Hinder Household Consumption Smoothing? Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C.
22. Keynes, J.M. (1936). *The General Theory of Employment, Interest, and Money.* London: Macmillan.
23. Kim, Y.K., Setterfield, M. and Mei, Y. (2014). Aggregate consumption and debt accumulation: an empirical examination of US household behaviour. Cambridge Journal of Economics, doi:10.1093/cje/beu029.
24. Krugman, P. (2007). Will there be a dollar crisis? Economic Policy, 22 (51), pp. 436-457.
25. Laurenceason, J. and Chai, J.C. (2003). Financial reform and economic development in China. Edward Elga publishing.
26. Lai, K. and Lam, R. (2002). "The Nexus of Consumer Credit, Household Debt Service and Consumption", HKMA Quarterly Bulletin.
27. Laurenceason, J. and Chai, J.C. (2003). Financial reform and economic development in China. Edward Elga publishing.
28. Marcus, J. (2012). Monetary policy and inflationary challenges in the face of the global economic crisis. Paper presented at the Numsa's 9th National Conference, Johannesburg. Retrieved from http://www.numsa.org.za/article/monetary-policy-and-inflationary-challenges-in-the-face-of-the-global-economic-crisis-2012-06-21.
29. Martinez-Carrascal, C. and del Rio, A. (2004). Household Borrowing and Consumption in Spain: A VECM Approach. Documentos de Trabajo No. 0421. Banco de Espana.
30. 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.
31. Muellbauer (2008). Household, Credit and Consumer Expenditure – SSRN EEPR Discussion Paper No. 6782.
32. The National Credit Act (NCA). (2005). No. 34 of 2005: National Credit Act, Act 2005. Government Gazette.
33. The National Credit Regulator (NCR). (2012). *Research on the increase of unsecured personal loans in South Africa's credit market: Final report.* 6 August.
34. National Treasury, (2011). "A Safer Financial Sector to Serve South Africa Better", National Treasury Policy Document; Republic of South Africa, 23 February.
35. Nieto, F. (2007). The determinants of household credit in Spain. Documento de Trabajo. N. 0716. Banco De Espana.
36. O'Toole, C., O'Connell, B. and Gerlach-Kirsten, P. (2013). How do banking crises affect aggregate consumption? Evidence from international crisis episodes. ESRI Working Paper No. 464.
37. Pesaran, M.H. and Pesaran, B. (1997). *Working with Microfit 4.0: interactive economic analysis*. Oxford University Press.
38. Pesaran, M.H. and Smith, R.P. (1998). Structural analysis of cointegrating VARs, *Journal of Economic Surveys*, 12, pp. 471-505.
39. Pesaran, M. and Shin, Y. (1999). "An autoregressive distributed lag modeling approach to cointegration analysis", in Strom, S. (Ed.), paper presented at Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch centennial Symposium, Cambridge University Press, Cambridge.
40. Pesaran, M.H., Shin, Y. and Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, pp. 289-326.
41. Prinsloo, J.W. (2002). "Household Debt, Wealth and Saving", South Africa Reserve Bank, *Quarterly Bulletin*, pp. 63-76.

42. Rajan, R.G. and Zingales, L. (2003). The great reversals: the politics of financial development in the twentieth century, *Journal of Financial Economics*, 69, pp. 5-50.

43. Saad, W. (2011). An econometric study of the private consumption function in Lebanon. *International Research Journal of Finance and Economics*, 61, pp. 29-41. Retrieved from http://www.eurojournals.com/IRJFE 61 04.pdf. [Accessed 12 May 2014].

44. Stiglitz and Weiss (1981). Credit Rationing in Markets with Imperfect Information, *The American Economic Review*, 71 (3), pp. 393-410.

45. The National Credit Act (NCA). (2005). "No. 34 of 2005: National Credit Act, Act 2005", Government Gazette.

46. The National Credit Regulator (NCR). (2012). Research on the increase of Unsecured Personal Loans in South Africa's Credit Market: Final Report, 6 August.

47. 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). Retrieved from http://hdl.handle.net/10292/670.

48. Žnuderl, N., O'Toole, C. and O'Connell, B. (2012). Trends in consumption since the Crisis: Ireland in Context. ESRI Research Note 2012/4/4. Quarterly Economic Commentary. Eurostat.