RISK, OPPORTUNITIES AND REASONS OF THE HOUSEHOLD DEBT CHANGES: THE CASE OF AN EMERGING ECONOMY

Sisimogang Tracy Seane*, Gisele Mah*, Paul Saah**

*School of economics and decision sciences, North West University, Mafikeng Campus, Private Bag X2046, Mmabatho, 2735, South Africa
**Graduate school, North West University, Mafikeng campus, Private Bag, X2046, Mmabatho, 2735, South Africa

Abstract

In the past decades, household debt in both developed and developing countries have been increasing. With an increase in the standard of living, household debt is also bound to increase. This paper examines the cointegration and causal link among household disposable income, household savings, and debt service ratio, lending interest rate, consumer price index and household debt in South Africa. An Autoregressive Distributed Lag and Granger causality techniques was used to analyse data collected from the South African Reserve Bank and Quantec from 1984 to 2014. The results of Autoregressive Distributed Lag test revealed cointegrating relationships between household debt and debt service ratio as well as household debt and lending interest rate. However, there is no long run cointegrating relationship between household disposable income, household savings and consumer price index with household debt. The Granger causality results revealed that household disposable income, household savings, debt service ratio, lending interest rate, consumer price index do Granger cause household debt in South Africa. Policy makers should thus target these variables in order to reduce household debt in South Africa.

Keywords: Household Debt, Household Disposable Income, ARDL Model, South Africa
JEL Classification: H31, C22, E21

1. INTRODUCTION

In the twentieth century, household debt has been increasing in most countries around the world, including South Africa. Morgan and Duncan (1982) assert that "If your outgo exceeds your income, your upkeep will be your downfall." Historically, being able to set financial goals and working towards achieving them has generally been the favoured method for ensuring that people had a savings safety net and emergency funds in place to bridge provisional drops in income. Even so, modern consumerism encourages immediate consumption placing greater emphasis on spending and less on saving (Roberts, Struwig, Gordon, Viljoen and Wentzel, 2012).

Borrowing has been made more attractive and accessible by low interest rates and the overall easing of credit constraints. These favourable conditions will best serve households by lowering their debt service cost, increase wealth and disposable income. An increase in debt can be expected in a greater financial inclusion market and a thriving economy. An increase in the supply of money for household loans is through the number of banks entering the credit market and competing for new consumers. Households now borrow for their day-to-day consumption, because of the low credit requirements (Chen Chen and Chivakul, 2008). Credit instruments range from long-term loans such as mortgages, overdraft facilities, credit cards and unsecured loans. Consumer borrowing in the form of unsecured loans has been growing rapidly over the years fuelling growth in household debt. Unsecured loans are commonly referred to as "easy cash" because they are easier to obtain. According to the National Credit Regulator (NCR) (2012), there has been a growth of more than 53% in unsecured loans between 2010 and 2011. Policy makers are concerned that unsecured loans continue to rise faster than household disposable income (Mutero, 2014).

Increasing borrowing to finance consumption is often viewed in the press and on Wall Street as a negative factor that will curtail spending and decrease economic growth in the long run. Available research suggests quite the opposite: Growth in credit consumption intends to be linked with a positive growth in consumption, ultimately stimulating economic growth (Rajan and Zingales, 2003). Consumption expenditure has been the key driver of South Africa's economic growth contributing nearly 60% of gross domestic product (GDP) (Stanlib, 2010).

Household debt reached elevated heights relative to disposable income during the global financial crisis in 2008, household debt to disposable income stood at 86.4%. In 2011, household debt stood at 79.8% and in 2015, it was 78% (South African Reserve Bank, 2016). Household

debt to disposable income ratio is still too high since more than 78% of the disposable income has to be used to pay debts. The consequences of indebtedness are high interest rates and high principal repayments which could impinge on the ability of households to cover living expenses, leading to a decrease in the standard of living and ultimately reduce consumer spending, in turn slowing down economic growth (Schmitt, 2000). Household finance has been attracting a lot of attention for quite a while, due to the elevated height of debt and the subsequent decrease in savings. Taking after an accommodative monetary policy stance, the South African Reserve Bank has cut down the repo rate, as a policy approach to help reduce debt rather than start further consumer spending (Hoosain, 2012).

Ferguson (2008) maintains that the Old Testament in the Bible speaks about the year of jubilee, where every 50 years, all debts would be cancelled. Sadly enough, this utopia is no longer relevant and does not exist anymore. Therefore, it is imperative that households apply the necessary financial skills and knowledge to avoid the misuse of credit as the points of advantages can quickly diminish. According to Piprek, Dlamini and Coetzee (2004), lack of financial literacy leads to poor financial decisions that have dire consequences and irreversible effects to already indebted households. Adequate financial management skills will help households to ease the effects of shocks in interest rates and income.

The high levels of household debt highlight how important the implementation of the National Credit Act (NCA) (No. 34 of 2005) was in South Africa and it was definitely implemented at the right time. The NCA was passed into law to provide consumers with the required skills and knowledge to understand the ever-changing financial market protect already over-indebted households and prevent reckless credit granting (NCA, 2005). Hurwitz and Luiz (2007) state that financial service providers are required to conduct a comprehensive analysis of consumer's affordability and understanding of the terms and conditions of debt contracts.

The high debt levels in South Africa could mean that household debt has surpassed other indicators such as income, net savings and wealth. The purpose of this study is to analyse the relationship and the direction of causality of the debt levels of South African households. This study strives to determine the long run cointegrating relationship between household debt and household disposable income, debt service ratio, household savings, interest rate and consumer price index (CPI) in South Africa from 1984-2014 using Autoregressive Distributed Lag (ARDL) Bounds testing model, and causality (using Granger causality) to estimate the direction of causality among variables.

The section above has provided a brief introduction of the study. Section 2 provides a review of literature relating to the relationship between household debt and its explanatory variables. The methodology used in the study is discussed in section 3. Section 4 presents interpretation of results and section 5 is a summary of the paper.

2. LITERATURE REVIEW AND THEORITICAL FRAMEWORK

In a study conducted by Jappelli (2010), it was found that out of the 50 countries surveyed, South Africa has the lowest number of economic literate people and the country is also the second lowest in terms of financial literacy. These results are alarming and highlight how South African households lack the necessary skills and knowledge to manage their finances adequately and to comprehend the ever-changing financial market. As a result, South African households have excessive debts and inadequate savings, and these have detrimental impacts not only on households but on financial entities and the economy as well.

Financial literacy has been a concern for financial entities and the government. Several initiatives and programmes have been undertaken to foster good borrowing behaviour and financial security. The National Credit Regulator (NCR) took an initiative to post educational messages on the pay slips of public sector employees on how to avoid debt and if already indebted, where to get assistance. Furthermore, other approaches such as television programmes were used to educate citizens on how to make wise financial choices (NCR, 2012). However, the NCR has been criticised for not being able to offer the needed training. Realistically, the NCR, on its own, cannot in any possible way, provide the necessary financial training to all South Africans. All industry stakeholders need to come together and assist and households need to take responsibility and put efforts to get necessary skills and knowledge to manage their finances adequately.

Training can take place in schools where the importance of good financial management can be stressed out at an early age before debt happens. The Banking Association of South Africa, together with the South African Savings Institute (SASI), launched a school-based programme called Teach Children to Save South Africa (TCTS SA). The main aim of the programme is to teach the importance of money and foster a culture of saving. The programme is for grade 4-7 learners and it is included in Economic and Management Sciences (EMS), (Messy and Monticone, 2012). Another method of training is workplace programmes. Such programmes only benefit those who are employed and this is only done when the company decides to provide assistance to employees. However, this is not always the case for Small, Medium and Micro-sized Enterprises (SMMEs). Unfortunately, these methods do not reach rural regions where poor households are increasingly falling into debt traps (Piprek *et al.,* 2004).

Piprek *et al.* (2004) also indicate that an effective and efficient financial literacy programme should be able to keep up with the evolving lifestyle of households and the ever-changing financial markets. Programmes will differ based on the purpose and target groups. A student will have a different financial literacy programme to that of an

older household member who is closer to retirement. It is also important that financial literacy programmes be continuous rather than a once off session, and should be designed to create long-term effects to benefit generations to come. Financial literacy programmes still have a long way to go in terms of changing the mindset and behaviour of South African households. Programmes targeting leaners at school will hopefully bear fruits later in the form of financially savvy adults. Financial literacy plays a substantial role in debt management.

The end of apartheid in South Africa brought many opportunities for households, financial institutions and the economy at large. Financial institutions are now able to cater for previously marginalised households and have the opportunity to increase their market share and revenue, thus kick-starting economic growth. However, the pitfall is that the more credit granted to households, the more bad debts and this ultimately leads to household delinquencies and insolvencies. Thus, the abnormal state of over-indebtedness by households in recent years is not only associated to changes in interest rates but also to the structural shift from the apartheid regime to a democratic government (Hurwitz and Luiz, 2007).

This study follows Keynes' (1936) absolute income theory, which is the most influential theory of current consumption and supported by Modigliani's (1975) life cycle hypothesis (LCH). The Keynesian theory maintains that current household consumption depends on current disposable income. According to Cronje (2009), the theory makes use of consumption of current income and disregards potential future income. Household consumption remains grounded on "Fundamental psychological law" and proclaims that an increase in income will result in an average person to increase consumption expenditure. Nowadays, consumption of households is said to be dependent on future potential income rather than current income as it was in the past (Mutero, 2014). Keynesian (1939) postulates that households spending decision depends on household's current income, future potential income and wealth, to ensure the same level of consumption over the years to come.

According to Modigliani (1975), the Modigliani's LCH maintains that household decision to spend relies upon resources availability in relation to the distribution of wealth over a lifetime. The theory boosts the principle of maximisation of utility (Dwivedi, 2010). Modigliani's input to the life cycle income hypothesis is based on the fact that consumption depends on current income and wealth (Saad, 2011). Saad (2011) further states that the Modigliani's LCH maintains that households consider their whole lifespan before deciding to spend, with the aim to smooth consumption in times of fluctuating income subsequent to age.

Below is a review of empirical studies for both developed and developing countries in relation to household debt. Using a panel of 7 OECD countries, Jappelli and Pagano (1994) assessed the effect of liquidity constraints on savings and growth. The results revealed that countries with lower borrowing have higher excess sensitivity (where capital market inadequacies are more imperative). Given such situation, credit availability may influence consumption. Chrystal and Mizen (2001) researched on household consumption in Britain using variables such as money, consumption expenditure and unsecured borrowing. The results revealed that unsecured debt and consumption are negatively correlated in the long-run, whereas the short run unconventionalities of consumption from its long-run equilibrium has a positive effect on lending.

Martinez-Carrascal and Del Rio (2004) used the Vector Error Correction Model (VECM) to analyse the effects of household borrowing and consumption in Spain. The results revealed that in the long run, interest rate has a negative impact on both consumption and lending, whereas wealth and labour income affects consumption and lending positively. Analysing the relationship between debt service ratio (DSR) and consumption using time series data of the US economy from 1992-2005, Johnson and Li (2007) found that changes in income is less sensitive to consumption of household with low liquid asset and more sensitive to consumption of household with high debt service ratio.

Using South Africa's dataset, Prinsloo (2002) examined the trends in household debt, wealth and savings between 1975 and 2001. The study found that material and social needs, fashion, taste, cultural and traditional beliefs, current debt to income ratio, cost and standard of living are some of the factors that determine spending and saving behaviour. Chipeta and Mbululu (2012) studied the effects of the National Credit Act (NCA) and the global financial crisis on domestic extension in South Africa. According to the authors, there was an upsurge in credit lending to consumers following the implementation of NCA.

Aregbeshola (2014) analysed time series data of South Africa's economy for 2001 to 2012 in order to investigate the true effects of financial deregulation on credit consumption and economic growth. The empirical outcomes of the revealed that economic growth increases in relation to an increase in credit consumption. Using South Africa's dataset for the period 1986 to 2013, Mutero (2014) used ADRL-bounds testing approach to analyse the relationship between household debt and consumption spending. The author found a short run relationship between household debt and disposable income, net wealth and inflation and that household debt and interest rate and inflation had a long run relationship.

During times of recession, households struggle to maintain high debt levels. Policy makers are concerned about consumer behaviour, which have a significant contribution to South Africa's GDP. The Reserve Bank is cleverly controlling interest rates in cases of high inflation rates to prevent high debt burden that will result in households not being able to pay back their debts, a situation experienced by the Greeks (Mutero, 2014). South African households are motivated to spend less and save more.

3. METHODOLOGY

This study relies on autoregressive-distributed lag (ARDL) – bounds testing approach by Pesaran, Shin, and Smith (2001), in an attempt to determine the existence of long run cointegration association between household debt and its explanatory variables. Annual time series data from 1984-2014 (30 observations) for South Africa was obtained from the South African Reserve Bank (SARB) and Quantec.

Household debt which measures the total amount of money owed by households to financial service providers served as the dependent variable. It comprises of consumer debt and mortgage loans. Household disposable incomes, debt service ratio, household saving were the explanatory variables. Another set of explanatory variables namely; cost of financing is proxied by normal interest rate and inflation rate are included as control variables in the system because they are deemed to have an effect on credit up-take by households.

Table 1. Description of variables and expected signs

Variables	*Description of variables*	*Expected signs*
HDI	Household disposable income	+ (positive)
DSR	Debt service ratio	+ (positive)
SAV	Household savings	-(negative)
INT	Lending interest rate	+ (positive)
CPI	Consumer price index	+ (positive)

Source: Own table of expected signs adapted from empirical literature

3.1. ARDL model specification

The model is theorized as follows:

$$HD_t = \beta_0 + \beta_1 HDI_t + \beta_2 DSR_t + \beta_3 SAV_t + \beta_4 INT_t + \beta_5 CPI_t + \varepsilon_t \quad (1)$$

β_0 to β_5 are the coefficients elucidating the elasticities of explanatory variables. ε_t is the error term. To examine the long-term and short-term dynamics, equation (1) is transformed into an ARDL specification reparametrized as an ECM. The ARDL model is identified as:

$$\begin{aligned}\Delta HD_t = \beta_0 + \sum_{i=1}^{n}\beta_{1i}\Delta HD_{t-i} + \sum_{i=1}^{n}\beta_{2i}\Delta HDI_{t-i} + \sum_{i=1}^{n}\beta_{3i}\Delta DSR_{t-i} + \sum_{i=1}^{n}\beta_{4i}\Delta SAV_{t-i} \\ + \sum_{i=1}^{n}\beta_{5i}\Delta INT_{t-i} + \sum_{i=1}^{n}\beta_{6i}\Delta CPI_{t-i} + \alpha_1 HD_{t-1} + \alpha_2 HDI_{t-1} + \alpha_3 DSR_{t-1} + \alpha_4 SAV_{t-1} \\ + \alpha_5 INT_{t-1} + \alpha_6 CPI_{t-1} + \varepsilon_t\end{aligned} \quad (2)$$

where, Δ is the first difference operator, β_0 is a constant and ε_t is a white noise disturbance. The long-run relationship is symbolized by coefficient $(\alpha_1 - \alpha_6)$ while the short-run dynamics of the model are denoted by $(\beta_1 - \beta_6)$. Following Hendry (1995), equation (2) is reparametrized as ECM to yield:

$$\begin{aligned}\Delta HD_t = \beta_0 + \sum_{i=1}^{n}\beta_{1i}\Delta HD_{t-i} + \sum_{i=1}^{n}\beta_{2i}\Delta HDI_{t-i} + \sum_{i=1}^{n}\beta_{3i}\Delta DSR_{t-i} + \sum_{i=1}^{n}\beta_{4i}\Delta SAV_{t-i} \\ + \sum_{i=1}^{n}\beta_{5i}\Delta INT_{t-i} + \sum_{i=1}^{n}\beta_{6i}\Delta CPI_{t-i} + \lambda EC_{t-1} + \varepsilon_t\end{aligned} \quad (3)$$

whereby, the speed of adjustment is denoted by λ and EC represents residuals obtained from the estimated cointegration model of equation (2). EC (Error correction term) is defined as:

$$EC_t = HD_t - \gamma_1 HDI_t - \gamma_2 DSR_t - \gamma_3 SAV_t - \gamma_4 INT_t - \gamma_5 CPI_t \quad (4)$$

where,

$\gamma_1 = -(\alpha_2/\alpha_1), \gamma_2 = -(\alpha_3/\alpha_1), \gamma_3 = -(\alpha_4/\alpha_1), \gamma_4 = -(\alpha_5/\alpha_1), \gamma_5 = -(\alpha_6/\alpha_1)$ are *Ordinary Least Square* (OLS) estimates variables which provide short run dynamics of the model covering the equilibrium path.

The error correction coefficient (λ) is expected to be less than zero meaning a negative number, which implies cointegration relation.

3.2. Estimation techniques unit root tests

Even though unit root tests is not required in ARDL modeling approach, it is still imperative to test for unit root or stationarity status of variables in order to ensure that the variables are integrated of order I (0) or I (1) or even the combination of both I (0) and I (1), and to make sure that there are no I (2) variables in the system to avoid a problem of spurious results otherwise the model can ultimately crash (Ouattara, 2004). To test for unit root or stationarity of variables, Augmented Dickey–Fuller (ADF) tests developed by Dickey and Fuller (1981) were used because they can handle a small sample size. According to Eita and Du Toit (2009), non-stationary variables are corrected in the short-run error correction model (ECM).

3.3. Cointegration test – ARDL-bounds testing approach

The bounds testing approach adopted in this study has some econometric advantages over other cointegration techniques such as Johansen (1991), Johansen and Juselius (1990) the maximum likelihood based approach and Engle-Granger (1987). Firstly, the bounds test is used for its simplicity of the cointegration test. Secondly, the ARDL model is distinctive in a manner that it does not need the same order of integration of variables. According to Pesaran and Pesaran (1997), the variables can either be integrated of order I (0) or I (1) or mutually integrated. Unlike the Johansen and Juselius (1990) cointegration method and others, the bounds testing approach allows for cointegration analysis to be assessed by OLS once the lag order of the model is known. Pesaran and Shin (1999) further state that problems of serial correlation and endogeneity are avoided when modeling ARDL bounds test with the appropriate lag. Lastly, the bounds test is more efficient in small sample sizes or few observations, especially for developing countries, just like the case in this study.

The test has some shortcomings as well. The bounds test cannot handle variables that are integrated of order I (2) or higher. When variables are integrated of order I (2), the computed F-statistics given by Pesaran et al. (2001) are not valid for the reason that the bounds test assumes that variables are either I (0) or I (1) or even the combination of both I (0) and I (1). Furthermore, the method cannot model more than one cointegrating vector.

Before testing for bounds test of cointegration, the order of lags on the first differenced variables in equation (2) have to be examined using the Akaike Information Criterion (AIC) or the Schwartz Bayesian Criterion (SBC) or even a combination of both. We choose the best model, that is, the one with the lowest AIC and SBC. The Schwartz Bayesian Criterion (SBC) was used in this study.

To determine the long run cointegration relationship between household debt and the independent variables, the bounds F-test is applied to equation (2) by OLS. The F-statistics tests joint null hypothesis that the coefficients of the lagged levels of the variables are zero, that is, the null hypothesis: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (no long run relationship exits) against the alternative: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$. We reject the null hypothesis of no long-run relationship if the calculated F-statistic is above the upper critical value I (1) at 5% level of significance regardless of the orders of integration for the time series. In opposition, if the computed test statistic is lower than the critical value I (0), we cannot reject the null hypothesis. Lastly, the results are regarded inconclusive if the calculated F-statistic is within the lower and upper critical values. The critical values for the F-test are obtained from Pesaran and Pesaran (1997).

When there is evidence of cointegration, there is a need to proceed with the error correction model. The error correction coefficient (ECM) is expected to be less than zero, which implies cointegration relation. The model will be tested for robustness by employing various diagnostic tests such as normality test, serial correlation and heteroscedasticity. The CUSUM and Ramsey RESET tests to the residuals of equation will be applied in order to test the model's stability. For the stability of the long-run and short-run coefficients, the plot of the CUSUM statistics must stay within the 5 % significant level.

3.4. Granger Causality Test

In order to determine the causal link between the variables studied, a Granger causality test was conducted. The standard Granger causality tests, whether the joint past value of both Y and X, explains the current change in X better than the past values of X alone will do. When the null hypothesis is not rejected, it is concluded that Y Granger causes X. A repeat of this process is done interchangeably for Y and X. The relationships could be unidirectional, bidirectional or no causality. The Granger causality test results are sensitive to lag lengths. To determine the optimal lag length for each series, the Schwartz Information Criterion (SIC) is used and an equation of an autoregressive is estimated by selecting a lag with the lowest SIC. Granger causality tests the direction of causation and knowing the direction of causation policy makers will know which variable to target first.

4. ESTIMATION RESULTS UNIT ROOT TESTS

The first step before we proceed with the bounds test is to determine the order of integration by conducting the unit root tests. Results of the unit root test confirm that after differencing data, all variables become stationary and integrated of order I (1). The hypothesis that household debt, household disposable income, debt service ratio, household savings, interest rate and inflation have unit root can be rejected.

Table 2. Augmented Dickey-Fuller (ADF) test in levels and first difference

Variables	*Model specification*	*ADF*	
		Levels	*First difference*
HD	Intercept	-1.776618	-3.292065**
	Trend and intercept	-3.886942**	-3.119599
	None	0.833202	-3.096155***
HDI	Intercept	-4.111024***	-6.152479***
	Trend and intercept	-4.291691***	-6.028504***
	None	-2.610971***	-6.274006***
DSR	Intercept	-4.113948***	-5.176458***
	Trend and intercept	-4.435294***	-5.173880***
	None	0.042052	-5.259976***
SAV	Intercept	0.102938	-5.107683***
	Trend and intercept	-3.194555	-4.456583***
	None	-1.291228	-7.051674***
INT	Intercept	-0.556144	-6.457633***
	Trend and intercept	-4.473275***	-6.532815***
	None	-0.757307	-6.556606***
CPI	Intercept	-1.373129	-4.725418***
	Trend and intercept	-0.696599	-4.902510***
	None	-2.100758**	-2.240277**

*Note: ***, **, *, denotes 1%, 5% and 10% level of significance. Results obtained from EViews*

4.1. Bounds test for cointegration

The initial step in ARDL analysis entails selection of the order of lags on the first differenced variables in equation (2). Results of the Schwartz Bayesian Criterion (SBC) suggest that the optimum lag for HD and HDI is 1, HD and DSR is 1, HD and SAV is 6, HD and INT is 1, HD and CPI is 6. The second step requires applying the bounds F-test to equation (2) to determine the existence of cointegration or long run relationship between household debt and explanatory variables. The F-statistics tests the joint null hypotheses that the coefficients of the lagged level variables are zero, that there is no long run cointegrating relationship against the alternative that variables are not zero (i.e there is existence of long run relationship). The results of the calculated F-statistics with critical values as suggested by Pesaran *et al.* (2001) are reported in Table 3 below.

Table 3. Bounds F-test for cointegration

Function	*F-test statistic*	*Probability value*	*Conclusion*
DHD(DHDI)	2.319431	0.1200	No Cointegration
DHD(DDSR)	6.525579	0.0055***	Cointegration
DHD(DSAV)	2.617601	0.1270	No cointegration
DHD(DINT)	13.07653	0.0001***	Cointegration
DHD(DCPI)	0.439369	0.6576	No cointegration

Notes: The critical values of bounds are in Pesaran et al. (2001), presented in Table 7 in the appendix.

The calculated F-statistic is greater than the upper bound I (1) critical value (5.73) at 5% level of significance; the null hypothesis of no cointegration can thus be rejected. Conversely, if the F- test statistic is lower than the critical value I (0) (4.94), we cannot reject the null hypothesis. Finally, if the statistic falls within the lower and upper critical values, the results are inadequate. Based on the results, it is evident that debt service ratio and interest rate have a long-run relationship with household debt consistent with the results of Kim, Setterfield and Mei (2014). However, household disposable income, household savings and inflation rate have no cointegrating relationship with household debt. It can be concluded that the abnormal state of over-indebtedness by households in recent years is not only associated to changes in interest rates, low net savings and higher disposable income but also the structural shift from the apartheid regime to a democratic government (Hurwitz and Luiz, 2007). Since there is evidence of cointegration, there is a need to proceed with the error correction model. Hence, the stability of the long run model for household debt in South Africa for the period 1984 to 2014 can be tested.

The results of SBC suggest that the optimum lag length of the entire model selected is 1. According to Moroke *et al.* (2014), when the coefficient of the Error Correction Term (ECT) is less than zero (-0.319907) and the probability is statistically significant (0.0373), this means the model has a speed of adjustment that is adequate in both short run and long run. This is a confirmation that the short run dynamics of the model are adjusted to the long-run equilibrium path rather than depraving from it. The model has an R-squared of 89.4 percent and Adjusted R-squared of 81.6 per cent which is an indication that the model is correctly fitted. This implies that every year, 81.6 per cent of disequilibrium was corrected.

4.2. Error correction model (ecm)

Table 4. Error Correction Model

Variable	*Coefficient*	*Probability*
D(HD(-1))	0.902092	0.0005
D(HDI)	0.036617	0.8621
D(HDI(-1))	0.196191	0.2181
D(DSR)	1.345584	0.1326
D(DSR(-1))	-1.377228	0.1371
D(SAV)	-1.192804	0.0059
D(SAV(-1))	0.127785	0.7199
D(INT)	-0.437595	0.3064
D(INT(-1))	0.291606	0.4837
D(CPI)	-0.251264	0.2339
D(CPI(-1))	0.071339	0.6707
ECT(-1)	-0.319907	0.0373
C	-0.511829	0.2016
R-squared 0.894683 **Adjusted R-squared 0.815695**		

In a short run, HDI is found to have a positive effect on HD. However, the probability value of 0.2181 is insignificant. The coefficient shows that a 1 percent increase in HDI can lead to an increase in HD by 19.6 per cent. The results further show that, no significant relationship exists between household debt and debt service ratio, household savings, interest rate and inflation rate.

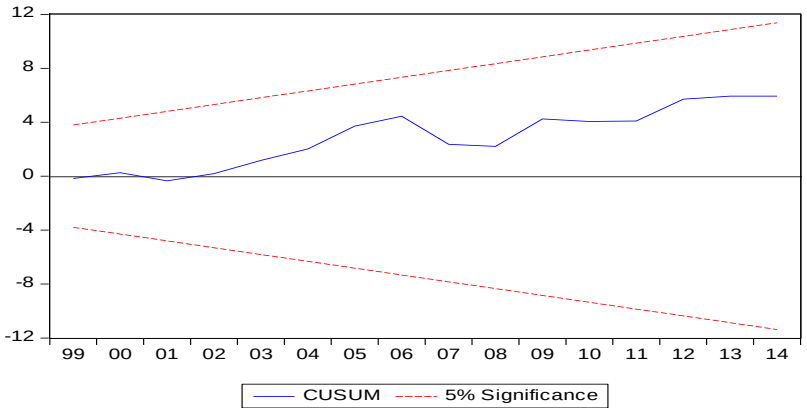
4.3. Diagnostic tests

The line that represents the cumulative sum of residuals is contained within the 5% critical lines, which serves as evidence that the estimated household debt model is stable as shown above.

Table 5. Diagnostic Statistics

Diagnostic test	*Null hypothesis*	*Statistic*		*Probability*	*Conclusion*
Normality test	Residuals are normally distributed	JB-statistic Skewness Kurtosis	1.963495 0.635200 2.894908	0.374656	Residuals are normally distributed
Serial Correlation: Breusch-Godfrey Serial Correlation LM Test	No serial correlation	Obs*R^2	3.175018	0.0748	There is no serial correlation
Heteroskedasticity: Breusch-Pagan Godfrey	No Heteroskedasticity	Obs*R^2	17.27999	0.1394	There is no heteroskedasticity
Specification Error: Ramsey RESET Test	Linear model is correctly specified	LR-statistic	0.188390	0.6643	There is no specification error

Figure 1: Plot of CUSUM for coefficients stability for ECM model



4.4. Results of granger causality

From Table 6, the results reveal that HDE, DSR, SAV, INT, CPI, DRS do Granger cause HD while HD does not Granger cause any of the variables in this study. This implies that if policy implemented targets HDE, DSR, SAV, INT, CPI, DRS first, it will have an effect on HD but if HD is targeted first, it will not have any effect on the independent variables.

Table 6. Results of Granger causality

Null hypothesis	*Obs*	*F-statistic*	*Probability*	*Conclusion*
HDI does not Granger cause HD	30	19.6737	0.0001	Reject , causality exists
HD does not Granger cause HDI		0.02810	0.8681	Fail to reject, no causality exists
DSR does not Granger cause HD	30	5.51541	0.0264	Reject, causality exists
HD does not Granger cause DSR		0.88175	0.3560	Fail to reject, no causality exists
SAV does not Granger cause HD	30	4.34480	0.0467	Reject, causality exists
HD does not Granger cause SAV		0.48636	0.4915	Fail to reject, no causality exists
INT does not Granger cause HD	30	4.84096	0.0365	Reject, causality exists
HD does not Granger cause INT		2.33717	0.1380	Fail to reject, no causality exists
CPI does not Granger cause HD	30	6.53722	0.0165	Reject, causality exists
HD does not Granger cause CPI		0.07852	0.7815	Fail to reject, no causality exists
DSR does not Granger cause HDI	30	5.65208	0.248	Accept, no causality exists
HDI does not Granger cause DSR		16.9899	0.0003	Fail to reject, causality exists
SAV does not Granger cause HDI	30	1.32498	0.2598	Accept, no causality exists
HDI does not Granger cause SAV		0.27442	0.6047	Fail to reject, no causality exists
INT does not Granger cause HDI	30	8.77112	0.0063	Reject, causality exists
HDI does not Granger cause INT		9.32906	0.0005	Reject, causality exists
CPI does not Granger cause HDI	30	4.92324	0.0351	Reject, causality exists
HDI does not Granger cause CPI		3.37603	0.0772	Fail to reject, no causality exists
SAV does not Granger cause DSR	30	1.70892	0.2021	Fail to reject, no causality exists
DSR does not Granger cause SAV		0.64550	0.4287	Fail to reject, no causality exists
INT does not Granger cause DSR	30	0.42969	0.5177	Fail to reject, no causality exists
DSR does not Granger cause INT		2.02737	0.1659	Fail to reject, no causality exists
CPI does not Granger cause DSR	30	1.09054	0.3056	Fail to reject, no causality exists
DSR does not Granger cause CPI		1.10478	0.3025	Fail to reject, no causality exists
IN T does not Granger cause SAV	30	3.07632	0.0908	Fail to reject, no causality exists
SAV does not Granger cause INT		0.79231	0.3813	Fail to reject, no causality exists
CPI does not Granger cause SAV	30	5.17659	0.0310	Reject, causality exists
SAV does not Granger cause CPI		0.34723	0.5606	Fail to reject, no causality exists
CPI does not Granger cause INT	30	0.07743	0.7829	Fail to reject, no causality exists
INT does not Granger cause CPI		0.40930	0.5277	Fail to reject, no causality exists

5. CONCLUSION

The bounds testing (ARDL) approach to cointegration has been used to test the long run and short run relationships between household debt, disposable income and debt service ratio, net savings, interest rate and CPI using South Africa as a case study. The bounds test suggest that variables of interest are bound together in the long run except for household disposable income, household savings and CPI. In the short run, no significant relationship exists between household debt and the explanatory variables. The associated equilibrium correction was also significant confirming the existence of long run relationships. The equilibrium correction is fairly fast and is restored every year. From the results of Granger causality, it is concluded that household disposable income, debt service ratio, household savings, interest rate, consumer price index jointly do Granger cause household debt.

The literature confirms that lack of financial literate consumers contributes to risk of being indebted. 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. Unfortunately, the debt problem experienced by South African households cannot be solved overnight. It is imperative that households have the necessary financial skills to avoid misusing credit as its advantage can decrease quickly. In the long run, the National Credit Regulator will also combat the debt problem.

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APPENDIX

Critical value of bounds for the F-statistic

Table 7. Case III with unrestricted intercept and no trend

	90%		*95%*		*97.5%*		*99%*		*mean*		*variance*	
K	*I*(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)
0	6.58	6.58	8.21	8.21	9.80	9.80	11.79	11.79	3.05	3.05	7.07	7.07
1	4.04	4.78	4.94	5.73	577	6.68	6.84	7.84	2.03	2.52	2.28	2.89
2	3.17	4.14	3.79	4.85	4.41	5.52	5.15	6.36	1.69	2.35	1.23	1.77
3	2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61	1.51	2.26	0.82	1.27
4	2.45	3.52	2.86	4.01	3.25	4.49	3.74	5.06	1.41	2.21	0.60	0.98
5	2.26	3.35	2.62	3.79	2.96	4.18	3.41	4.68	1.34	2.17	0.48	0.79
6	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43	1.29	2.14	0.39	0.66
7	2.03	3.13	2.32	3.50	2.60	3.84	2.96	4.26	1.26	2.13	0.33	0.58
8	1.95	3.06	2.22	3.39	2.48	3.70	2.79	4.104	1.23	2.12	0.29	0.51
9	1.88	2.99	2.14	3.30	2.37	3.60	2.65	3.97	1.21	2.10	0.25	0.045
10	1.83	2.94	2.06	3.24	2.28	3.50	2.54	3.86	1.19	2.09	0.23	0.41