EFFECTIVENESS OF THE NATIONAL CREDIT ACT OF SOUTH AFRICA IN REDUCING HOUSEHOLD DEBT: A JOHANSEN COINTEGRATION AND VECM ANALYSIS

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Abstract

The rise in unsecured lending has cast doubt on the effectiveness of the National Credit Act in South Africa. Reckless lending was seen rising since 2006 and plateauing in 2009. Could this be evidence of the effectiveness of the National Credit Act (NCA) curbing reckless lending household debts? This study embarks on finding whether reckless lending was present in the Pre-NCA period running from 1994 to the end of 2nd quarter of 2007 when the NCA was enacted. Further in this study, the effectiveness of NCA in curbing reckless lending in the Post-NCA period starting from the 3rd quarter of 2007 to the 2nd quarter of 2014. Using the Johansen Cointegration analysis and Vector Error Correction Model, long run and short run Granger causality tests are done with the household debt as a dependent and debt service coverage ratio, household debt to disposable income ratio and disposable income as independents. The results from the tests done provide convincing evidence that reckless lending indeed was present in the Pre-NCA period and there is evidence showing the curbing of reckless lending in the Post-NCA period.

Keywords: National Credit Act, VECM, South Africa, Household Debt, Reckless lending

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1. Introduction

There has been a gradual rise in unsecured lending in the credit markets of South Africa. This has been precipitated by the restrictions to reckless lending which were brought about by the introduction of the National Credit Act (NCA) 34 of 2005 in South Africa. The National Credit regulator who is mandated to administrate and implement the NCA indicates that the total outstanding gross debtors' book of consumer credit for the quarter ended June 2014 was R1.57 trillion. Apparently, mortgages have the largest portion of this gross debtor's book of 53.18% followed by secured credit agreements at 21.69%, credit facilities at 12.44%, unsecured lending at 10.98%, with developmental credit at 1.66% and short-term credit at 0.04% (Consumer Credit Market Report, 2nd Quarter report, 2014) However concern has been expressed on how unsecured lending has been on the rise as reported by Angilique Arde in the Independent Online newspaper of 25 March 2012:

''Half of South Africa's consumers who use credit have impaired credit records and every month about 6 000 consumers apply for debt counselling. Over the past year (2011), there has been a 53-percent growth in unsecured lending.'

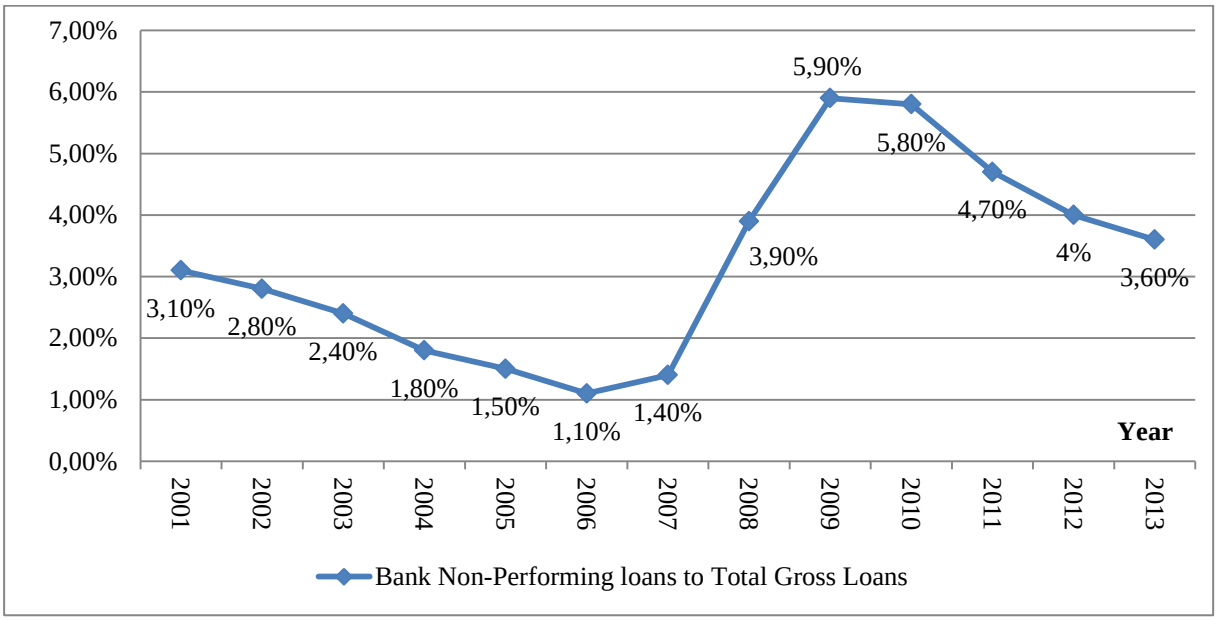
It has been observed in legal and government sectors that South Africa's insolvency legislation is in adequate in combating overspending and over-indebtedness. Renke (2011) asserts that the Usury Act – that was in effect for many years - was not enough as legal regulator of consumer credit markets before its eventual repeal by South Africa's newest piece of consumer credit legislation, the National Credit Act. In conjuction to this, Roestoff and Renke (2003) seem to agree with the findings by the Technical Committee, Credit Law review (2003) on how the Usury Act did not protect consumers from over-indebtedness through reckless credit granting by credit providers.

Three instances are given as reckless lending in the National Credit Act. Firstly, in the instance where the credit provider fails to conduct an assessment as required by the Act, despite the outcome of the unauthorized credit assessment might have concluded at the time. Secondly, where the credit provider, conducts credit assessment, and proceeds to conclude a credit agreement with the consumer regardless of the fact that the information available to the credit provider indicates that the consumer does not generally understand or appreciate the consumer's risks, costs or obligations under the proposed credit agreement. The third instance is where the credit provider, having conducted an assessment, concludes a credit agreement with the consumer in spite of the fact that the information available to the credit

provider indicates that entering into that credit agreement would make the consumer over indebted.

However the regulators (NCA) and the South African Reserve Bank (SARB) believe the National Credit Act is doing well in constraining the imprudent credit provision which leads to consumer indebtedness. The South African Banks non-performing loans to total gross loans decreased gradually from 3.1% in 2001 to 1.1% in 2006 which was at its lowest and peaking to 5.9% 2009 as shown in Figure 1. The sharp decline can be attributed to the enactment of the National Credit Act in 2007 whose set up and rolling out started in 2004. The Credit Bureau Monitor (2014:Q2) and the SARB Quarterly bulletin (2014:Q3) however gave a contrasting scenario to the level of Household indebtedness in South Africa, with the SARB indicating that the household debt to income was at 73,5% as of 2014 second quarter compared to its highest of 76.3% in 2012, second quarter. On the other hand the Credit Bureau monitor report also indicated a decline in household with more than 3 months in arrears declining from 18.7% in September 2011 to 28.3% in June 2014. Prinsloo (2002) indicates that the spending and saving behaviour is determined by a number of factors such as material and social needs, tradition, standard of living, existing indebtedness, net worth and disposable income. With this brief background and a mixed signal of the statistics on household indebtedness, especially around the period of NCA enactment, there is a need of analysing the extent of how reckless lending has been contained by implementing the consumer protection law (NCA). Furthermore, Figure 1 shows how the non-performing loans increased during the period the NCA was enacted – from 2007 to 2009. This situation therefore raises the need to find out if reckless lending has been curtailed by the new consumer credit regulation or not.

Figure 1. South African Banks Non-Performing Loans to Total Gross Loans



Source: World Bank -International Monetary Fund Database (2014)

The research was conducted to statistically prove whether the National Credit Act has been successful in combating reckless lending and particularly to what degree can it be ascertained that indeed the NCA has managed to curb reckless lending. The main emphasis was to look at two periods which are divided by the enactment of this NCA that is from 1994 to 2007 and from 2007 to 2014. The main idea was to find out if the household data of disposable income, household debt, debt service coverage ratio and household debt to income ratio can tell us anything about the success of the NCA in combating imprudent credit provision to consumers in South Africa. The next section discusses the literature on the theory of household indebtedness and empirical studies that have been done on issues relating to household indebtedness. Following this, a description of the data, the research methodology used for analysing the data, the results are presented, followed by a discussion of the results. Then finally the implications, contributions of the research and the conclusions are done.

2. Literature Review

2.1 Definition of Reckless Lending

An exploration of given legal terms of unfair lending practices being reckless lending is done by Porteous (2009). The terms looked at are reckless lending (as

stipulated in the South African National Credit Act (NCA) of 2005); predatory lending (as defined by the Federal Deposit Insurance Corporation (DFIC), 2006) and Consumer Credit Act in the UK termed an unfair relationship between lender and borrower. It is further asserted that reckless lending and predatory lending insinuate various meanings of unfair credit lending practices and this gives rise to generalization of the terms reckless lending and predatory lending in such a way that it is difficult to enforce legally. This gives rise to the inability of identifying and enforcing reckless lending, especially when households do not give complete and correct information during the credit decision making time. Such undeclared information is prevalent at household and personal levels leading to unclear creditworthiness in these sectors. Pottow (2007) adds another dimension of how to understand the problem of reckless lending, especially in the USA context, by insinuating the need to link debt to bankruptcy filing. The filing for bankruptcy in USA is equivalent to the South African declaration of insolvency and the use of the debt counselling facility as provided under the NCA to be rehabilitated out of debt. In order to avoid the regurgitation of explanations and meaning of the following terms household debt, disposable income and household indebtedness being used in this research, inference from economic and banking literature, especially the microeconomics of the household is made.

2.2 Causes of Household Over-Indebtedness

There is need to understand the definitions of household indebtedness and household over-indebtedness and their links to reckless lending. D'alessio and Iezzi (2013) define household indebtedness in light of the life-cycle-permanent income theory which stipulates how households at early stages of life incur debt in anticipation of paying it in the future with assumed improvement in income. Conversely the households spurred by this assumption spend more than they can earn leading to household indebtedness. However the European Union Commission report (2007) on EU Household Indebtedness indicates the difficulty of defining and measuring household indebtedness given differing socio-economic contexts and legislation across the European continent.

Betti et.al (2007) in their study indicate that over-indebtedness is exhibited by a wide array of indicators which include debt to income ratio, rate of loan delinquencies and number of households self-reporting to be in arrears. This shows how wide and subjective household indebtedness can be defined as shown in the literature (Kempson (2002), Keese (2009), Lusardi and Tufarno (2009.)). From the literature it is clear that over-indebtedness and indebtedness is loosely used interchangeably. This issue might cause problems in finding the right proxy for household indebtedness. In conjunction to this, Keese (2009) links irresponsible lending – which in our case can be referred to as impudent or reckless lending – to causing indebtedness. A working definition for over-indebtedness is given by Disney et.al. (2008) as the state of a consumer falling into arrears on at least one credit obligation. However Schicks (2013) illustrates the meaning of over-indebtedness in light of consumer protection which differs from the definitions given by authors cited above. Furthermore Schicks illustrates a comprehensive overview of how over- indebtedness is defined in consumer finance and microfinance literature depending on the type of research being done as shown in Figure 2.

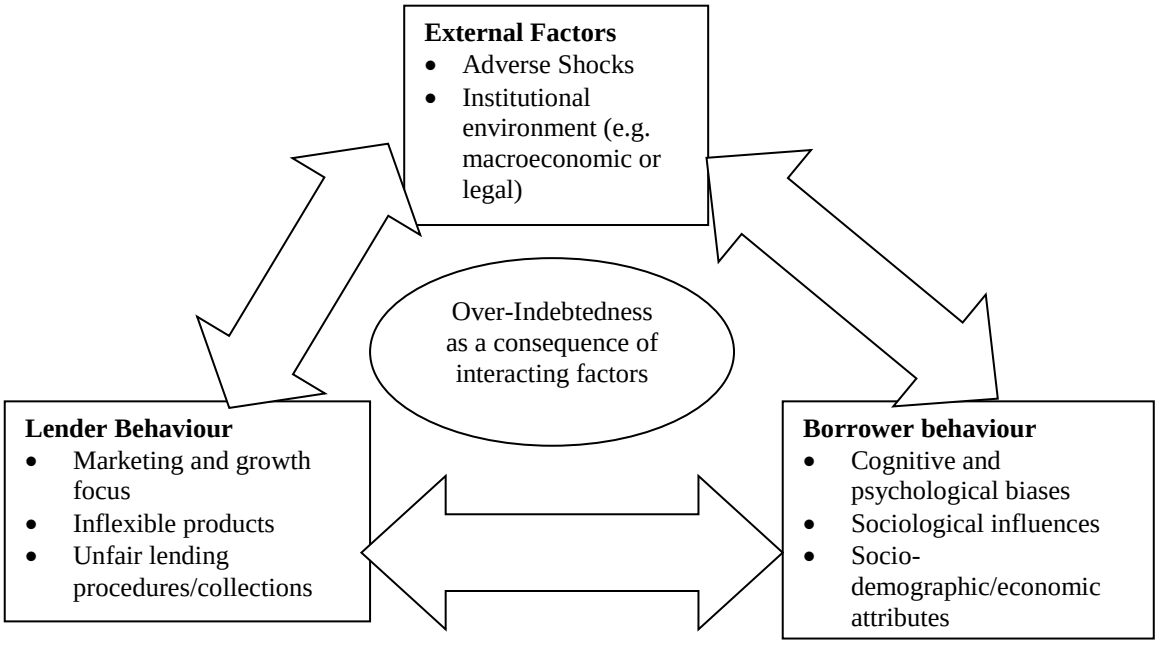
Figure 2. Dimensions of Defining Over-indebtedness

Type of Choice	Dimension of Choice	Categories			
1. Purpose	*Scientific Lens*	Legal	Economic	Sociological	Other
	Precision	Definition	Indicator	Proxy	
	Reference Unit	Individual	Household	Network of Kin	Aggregate
2. Method	*Composition*	Single Criterion	Multiple criteria		
	Scale	Quantitative	Qualitative		
	Perspective	Objective	Subjective		
	Data Source	External	Self Reported		
3. Severity	*Time Horizon*	Current	Structural	Permanent	
	Debt Condition	Bankruptcy	Default	Arrears	Imbalance
	Role of the borrower	Innocent	Unintended	Deliberate[1]	
	Level of sacrifice	To minimum existence level	More than expected	Liquidity buffer[2]	No sacrifice
[1] For example, Strategic default or fraud					
[2] Inability to meet expenses					

Source: Adopted from Schicks (2010)

Schicks summarized a comprehensive view of the factors that lead to over-indebtedness as shown in Figure 3, though based on empirical literature of micro-finance it shares similarities with the reviewed literature above. As illustrated in figure 3, the interaction of lender behaviour, borrower behaviour and external factors chiefly determines the over-indebtedness of the borrower.

Figure 3. The Drivers of over indebtedness



Source: Adopted from Schicks (2010)

Dynan and Kohn (2007) argue that the main causes of a dramatic rise in USA household over-indebtedness are linked to the dramatic drop in household savings. They further show, through simple household behaviour models, how – empirically- changes in tastes, interest rates, and households' expected incomes do not appear to have materially increased household debt. However, they assert that demographic shifts partly clarify the run-up in debt. The rise in house prices, though not exclusive, can cause increased household debt, and the house price increases usually is the main driver of household debt increases. This notion is evidenced by the National Credit Regulator's statistics on the consumer credit market in South Africa which shows that house mortgage has a larger share of the gross debtors book (Consumer Credit Report, 2014:Q2)).

In another study, Ezeoha (2011) shows that - through an empirical study of Nigerian banks from 2004 to 2008- reckless lending was fuelled by excess liquidity and relatively huge capital bases. Further it is asserted that increased levels of unsecured lending in banks portfolios albeit aided the mitigation of non-performing loans within the studied period through the application of stringent measures. One of the significant outcomes of this study is that, a regulation induced industry consolidation in Nigeria was indicated as a cause for heightened incidences of non-performing loans. It was going to be better if the study investigated human induced factors that could cause the high loan delinquency and more so question the effectiveness of the credit regulation. South African banks currently are incurring a huge increase in unsecured lending and this could be traced to the National Credit Act by the supposition that banks are now innovating credit products that can smartly outclass the stringent requirements of this act.

Through a quantitative model, Sanchez (2008) highlights how the revolution of I.T managed to reduce information costs in lending to households but contrary increasing bankruptcy by 40%. Within the same conjecture, Levitin (2009) indicated how financial innovation in the USA retail financial services did churn 'negative innovations,' which were evidenced in vague pricing, including billing tricks and traps that encourage unsafe lending practices. Thus financial innovation also seem to have considerably contributed to increased household debt, but not in the sense of increasing the share of households that are able to borrow but instead increasing the amount of debt of households that already had some access to borrowing.

Hussain (2002) explores the reasons for the remarkable rise in personal bankruptcies in UK since 1999. The study used a robust regression analysis model which proved that increased indebtedness leads to more bankruptcies. From the econometric analysis it is concluded that there are two ways by which indebtedness affects bankruptcies. Firstly increased indebtedness causes high debt and this

reduces the household ability to borrow more and thus exposing them to adverse economic shocks. Secondly, the debt to income ratio is a good indicator of the credit quality of the borrowers. Therefore given a financial liberalized environment a high debt to income ratio indicates a shifting of the credit limits to accord credit to the households that could not afford it. Other authors attest to these findings (Rinaldi and Sanchis-Arellano (2006), Dygan-Bump and Grant (2009), Livshits et.al (2007).

The dimensions of over-indebtedness are varied in the spectrum of demographics. Therefore there are many perspectives of defining indebtedness. The literature above has clearly shown that household indebtedness is a good balance of the household expenses, debt and income whilst the over-indebtedness is bad balance of these variables. The main causes - as gleaned from literature - of over-indebtedness are improper regulation of credit markets, life cycle aspects of the household, financial innovation that circumvents robust credit regulation, unsecured lending and adverse economic conditions. This section clearly articulates the sources of household over-indebtedness and therefore it will be prudent to have a view of the consumer credit protection laws internationally and particularly in South Africa.

2.3 Consumer Credit Protection Laws – an International and South African Perspective

Rossouw (2008) in her study indicates that the South African's National Credit Act has been influenced by Canadian, Australian and British historical behaviour regarding reckless lending and over indebtedness. The evidence presented to back this is based on the similarities of South Africa's lending history to that of Australia in terms of the causes of increased household debt due to increased consumer credit, which are increased credit lending rate, high and unregulated lending in the informal credit markets and general reckless lending behaviour in the credit markets. The other evidence presented was the similarity of consumer protection laws in South Africa to that of Canada, Australia and Britian in curbing reckless lending. Additionally Rossouw concluded from the investigation that the NCA was effective in protecting the households from reckless lending through capped interest rates and lending based on affordability especially during the period of the global economic downturn in 2007 – 2008. The same notion is supported by the Finmark Trust Report done by Pearson and Greef (2006) which indicated that price control on loan products was only adequate accompanied by regulation of imprudent lending practices. Pearson and Greef depict credit regulation into three pillars by tabling a crosswise comparison of these three pillars as presented in Table 1. The first column concerns the assessment of clients' ability to repay, second pillar is about the divulging of all credit costs and the third pillar refers to interest rate caps or usury laws. It can be observed that the South African NCA meets all the three criteria for an adequate credit law which offers protection against reckless lending.

Table 1. Credit Laws of Various Countries

	Pillar I	Pillar II	Pillar III
France		APRC includes all costs and has to be published.	A loan is stated as usury when the rate exceeds the average effective rate of the prior quarter (published by the Bank of France) by one third.
Germany		APRC[1] includes all costs and has to be published.	If the APR is double the market interest rate and there has been abuse of an exigency, inexperience, lack of judgment or substantial weak will, the interest rate is illegal according to court orders.
Switzerland	Attachable income has to be high enough to pay back the credit within 36 months.	APRC includes all costs.	Interest cap usually fixed below 15 % per annum.
United Kingdom		APRC includes all costs and has to be published.	Usurious credit agreements can be reopened by court.
United States		APR includes all costs according to the Federal Truth and Lending Law	Different regulations in every state.
South Africa	National Credit Act requires lender to assess the client's ability to pay.	All costs must be disclosed in terms of the National Credit Act and Regulations.	Regulations provide for maximum rates of interest applicable to seven different types of credit.

Source: Finmark Trust (Pearson and Greef, 2006)

[1] APRC – Annual Percentage Rate of Change

It can be seen from Table 1 that the emphasis of the consumer credit protection laws internationally is the need to ensure that households are given credit that they can afford to pay back, are not overcharged on interest payments and that all loan costs should be transparent to avoid over-indebtedness. In such a case anything that deviates from this is deemed reckless lending.

Conclusively the literature reports the presence of consumer credit law that inhibits reckless lending. However to the best of our knowledge there are no studies that prove their effectiveness and try to link indebtedness to inadequate credit regulation quantitatively. For the case of South Africa most of the studies are a mere attempt, by legal experts in their studies, to prove how the new NCA managed to curb reckless lending and this is done qualitatively (Stoop, 2009, Otto, 2008). However since lending has also a quantitative aspects we devise a statistical model to test the impact of the NCA in curbing reckless lending. The need to evaluate the effectiveness of the NCA after its implementation is necessary as posed by Brix and Mackee (2010). Thus the following section describes the research methods employed to achieve the purpose of this research, namely to find the effectiveness of the NCA in curbing reckless lending in South Africa and results thereof are also presented and discussed.

3. Data and Methodology

Secondary data was obtained from the South African Reserve Bank economics statistics database. Quarterly time series data ranging from 1994:1 to 2014:3 was used. The model specification and assumptions are presented in the next section.

3.1 Model Specification

The research methods constituted the use of the Johansen Co-integration System test and the Vector Error Correction Model for long and short run equilibrium tests among the variables chosen to measure the impact of the National Credit Act on household debt. Econometric tests are performed and applied on the time series data which is split into two periods:

1. From 1994:1 to 2007:2 (Before the enactment of the NCA) to determine the relationship between household debt, household savings, household disposable income and debt service costs.
2. From 2007:3 to 2014:3 (after the Enactment of the NCA) to determine the relationship between household debt, household savings, household disposable income and debt service costs.

In order to test the relationships amongst the variables the following model is constructed:

$$\Delta HHd = f(HH_d, HH_Y, HHdY, DSCY) \qquad (1)$$

Where:

HH_d is the household debt

HH_y is the household disposable income

HHdY is the ratio of household debt to household disposable income

DSCY is the ratio of debt service ratio to household disposable income

The collected data to these variables are logged for analysis.

3.2 Johansen Co-integration Technique

In this section the technique that will be used to test co-integration for long run as well as short run relationships for the multivariate equation will be explained. This technique was formulated by Johansen (1988) and later amplified by Johansen and Juselius (1990).

An assumption is made of three variables W_t, X_t and Y_t which can all be endogenous. Using matrix notation represented by Z_t= (W_t, X_t and Y_t) the following equation is proposed:

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \cdots + A_k Z_{t-k} + u_t \qquad (2)$$

It can be reformulated into a vector error correction model (VECM) as follows:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \cdots + \Gamma_{k-1} \Delta Z_{t-k} + \Pi Z_{t-1} + u_t \qquad (3)$$

Where:

$$\Gamma_i = (I - A_1 - A_2 - \cdots - A_k)(I = 1,2, \ldots k-1) \; and$$
$$\Pi = -(I - (I - A_1 - A_2 - \cdots - A_k)$$

In this example there is need to examine the 3 X 3 Π matrix (the Π matrix is 3 X 3 due to the fact that we assume three variables in Z_t = (W_t, X_t and Y_t) The Π matrix contains information regarding the long run relationship. In fact $\Pi = a\beta'$ where a will include the speed of adjustment to equilibrium coefficients while β' will be the long run matrix of coefficients.

Therefore the $\beta' Z_{t-1}$ term is equivalent to the error correction term ($Y_{t-1} - \beta_0 - \beta_1 X_{t-1}$) in the single equation case, except that now $\beta' Z_{t-1}$ contains up to (n – 1) vectors in a multivariate framework.

For simplicity we assume that k = 1, so that we have only two lagged terms and the model is then the following:

$$\begin{bmatrix} \Delta W_t \\ \Delta X_t \\ \Delta Y_t \end{bmatrix} = \Gamma_i \begin{bmatrix} \Delta W_{t-1} \\ \Delta X_{t-1} \\ \Delta Y_{t-1} \end{bmatrix} + \Pi \begin{bmatrix} W_{t-1} \\ X_{t-1} \\ Y_{t-1} \end{bmatrix} + \varepsilon_t$$

Or

$$\begin{bmatrix}\Delta W_t\\ \Delta X_t\\ \Delta Y_t\end{bmatrix} = \Gamma_i \begin{bmatrix}\Delta W_{t-1}\\ \Delta X_{t-1}\\ \Delta Y_{t-1}\end{bmatrix} + \begin{bmatrix}a_{11} & a_{12}\\ a_{21} & a_{22}\\ a_{31} & a_{32}\end{bmatrix}\begin{bmatrix}\beta_{11} & \beta_{21} & \beta_{31}\\ \beta_{12} & \beta_{22} & \beta_{32}\end{bmatrix}\begin{bmatrix}W_{t-1}\\ X_{t-1}\\ Y_{t-1}\end{bmatrix} + \varepsilon_t \quad (4)$$

For the sake of expediency, we analyse the error correction part of the first equation (that is for ΔW_t on the left hand side) which gives;

$$\Pi_1 Z_{t-1} = \left([a_{11}\beta_{11} + a_{12}\beta_{12}][a_{11}\beta_{21} + a_{12}\beta_{22}] \times [a_{11}\beta_{31} + a_{12}\beta_{32}] \begin{bmatrix}W_{t-1}\\ X_{t-1}\\ Y_{t-1}\end{bmatrix} \right) \quad (5)$$

Where, Π_1 is the first row of the Π matrix. The above equation can be rewritten as;

$$\Pi_1 Z_{t-1} = a_{11}(\beta_{11}W_{t-1} + \beta_{12}X_{t-1} + \beta_{13}Y_{t-1}) + a_{12}(\beta_{32}W_{t-1} + \beta_{12}X_{t-1} + \beta_{22}Y_{t-1}) \quad (6)$$

Which shows clearly the co-integrating vectors with their respective speed of adjustment terms a_{11} and a_{12}

In order to get reliable results the study follows procedures as per Johansen (1988) and Johansen and Juselius (1990) which are listed below.

1. For the application of Johansen Co-integration approach, all time series variables used in this study should be integrated of order one [I(1)].

2. At second step, lag length would be chosen using VAR model on the basis of minimum values of Final Predication Error (FPE), Akaike Information Criterion (AIC), and Hannan and Quinn information criterion (HQ).

3. At third step, appropriate model regarding the deterministic components in the multivariate system are to be opted.

4. Johansen (1988) and Johansen and Juselius (1990) examine two methods for determining the number of co-integrating relations and both involve estimation of the matrix Π. Maximal eigenvalue statistics and trace statistic are utilized in fourth step for number of co-integrating relationships and also for the values of coefficients and standard errors regarding econometric model.

3.3. Vector Error Correction Mode (VECM)

A vector error correction model is a restricted vector autoregressive (VAR) designed for use with non-stationary series that are known to be co-integrated. It may be tested for co-integration using an estimated VAR object. The VECM has co-integration relations built into the specification so that it restricts the long run behaviour of the endogenous variables to converge to their co-integrating relationships while allowing for short run adjustment dynamics. The co-integration term is known as the error correction term (speed of adjustment) since the deviation from long run equilibrium is corrected gradually through a series of partial short run adjustments. The Short run equations are given below;

$$\Delta HHd = a_0 + \sum_{j=1}^{p} a_1 \Delta HHd_{t-j} + \sum_{j=0}^{p} a_2 \Delta HHy_{t-j} + \sum_{j=0}^{p} a_3 \Delta HHdY_{t-j} + + \sum_{j=1}^{p} a_4 \Delta DSCY_{t-j} + \Psi_1 ECT_{t-1} + \varepsilon_{1t} \quad (7)$$

$$\Delta HHy = a_0 + \sum_{j=1}^{p} a_1 \Delta HHy_{t-j} + \sum_{j=0}^{p} a_2 \Delta HHd_{t-j} + \sum_{j=0}^{p} a_3 \Delta HHdY_{t-j} + + \sum_{j=1}^{p} a_4 \Delta DSCY_{t-j} + \Psi_1 ECT_{t-1} + \varepsilon_{1t} \quad (8)$$

$$\Delta HHdY = a_0 + \sum_{j=1}^{p} a_1 \Delta HHdY_{t-j} + \sum_{j=0}^{p} a_2 \Delta HHd_{t-j} + \sum_{j=0}^{p} a_3 \Delta HHy_{t-j} + + \sum_{j=1}^{p} a_4 \Delta DSCY_{t-j} + \Psi_1 ECT_{t-1} + \varepsilon_{1t} \quad (9)$$

$$\Delta DSCY = a_0 + \sum_{j=1}^{p} a_1 \Delta DSCY_{t-j} + \sum_{j=0}^{p} a_2 \Delta HHd_{t-j} + \sum_{j=0}^{p} a_3 \Delta HHdY_{t-j} + + \sum_{j=1}^{p} a_4 \Delta HHy_{t-j} + \Psi_1 ECT_{t-1} + \varepsilon_{1t} \quad (10)$$

Where, Δ is difference operator, p is chosen lag length, a's are parameters, Ψ is error correction term or speed of adjustment term (calculated from long run results) and ε is error term with mean zero. VECM equations (7) to (10) state that ΔHHD, ΔDSCY, ΔHHdY and ΔHHY depend on their own lagged value, other variables' lagged value and also on the equilibrium error term. Since $\Psi_1 ECT_{t-1}$ is negative and therefore ΔHHD, ΔDSCY, ΔHHdY and ΔHHY should be negative in order to restore the long-run equilibrium. That is, ΔHHD, ΔDSCY, ΔHHdY and ΔHHY are above their equilibrium value, they will start falling in the next period to correct the equilibrium error. In the same way, if ECT_{t-1} is negative (that is, ΔHHD, ΔDSCY, ΔHHdY and ΔHHY are below equilibrium value), $\Psi_1 ECT_{t-1}$ will

be positive which will cause ΔHHD_t, $\Delta DSCY_t$, $\Delta HHdY_t$ and ΔHHY_t to rise in period *t-j*. Thus, the absolute value of Ψ_1 decides how quickly the equilibrium is restored.

4. Empirical Results and Discussions

In this section the results of the outlined methodology in section 3 are presented and the implications of the results are also discussed.

4.1. Unit Root Tests

For reliability and validity, the data was logged and unit root tests were done using both the Dick – Fuller and the Augmented Dickey-Fuller tests with results being presented in Table 2. After having the evidence of unit roots which shows an integration of order one –I (1) which implies modelling the data in first difference ($(\Delta y_t = y_t - y_{t-1})$ to make it stationary. A time series data is deemed stationary if it has constant variability over time and this prevent issues of spurious regressions associated with non-stationary time series models. All variables mostly attained stationary at first and second differences except for LDSCY in the Pre-NCA period which was stationary at level and non-stationary at first difference. However in the Post-NCA period all variables are stationary at first and second difference with LHHD being stationary at level.

Table 2. ADF Unit Root Test Results (logged data)

Variables	Pre-NCA (1994/1 to 2007/2)					
	Level		First Difference		Second Difference	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept
LDSCY	-3.946781***	-11.57490***	-1.722718	-2.220921	-12.25801***	-12.23886***
LHHd	-1.904262	-2.453687	-3.954897***	-3.918184***	-7.976003***	-7.890602***
LHHdY	-1.543681	1.030742	-1.170330	-6.521751***	-8.000371***	-7.982396***
LHHY	-0.121739	-1.918340	-12.96469***	-12.74364***	-10.24191***	-10.23369***
	Post NCA (2007/3 to 2014/4)					
	Level		First Difference		Second Difference	
Variables	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept
LDSCY	-0.672233	-1.190176	-3.028674***	-3.058459	-3.599363***	-3.689278***
LHHd	-1.585104	-3.944707***	-3.471231***	-3.567081**	-7.964502***	-7.831252***
LHHdY	0.155862	-2.462281	-4.287991***	-4.170944***	-6.575564***	-6.420915***
LHHY	-0.042906	-2.231937	-12.61529***	-12.27152***	-5.334261***	-5.411293***

Note: *, **, *** shows critical values at 10, 5 and 1 percent level of significance respectively

4.2. Lag Length Selection Process

Second step of Johansen Co-integration technique involves the selection of appropriate lag length using proper information criterions. The results are reported in table 3. Favourable lag length that is selected in current analysis is assumed to be 4 at most for the variables in the Pre-NCA period. The lag length for the variables in the Post –NCA period is indicated as 4 but we have used 3 lags since these proved to be more optimum for our analysis.

Table 3. Lag Length (Pre NCA and Post NCA)

Pre-NCA Period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	164.1705	NA	1.70e-08	-6.537569	-6.383135	-6.478977
1	463.9134	538.3138	1.59e-13	-18.11891	-17.34674*	-17.82595
2	490.6192	43.60131	1.04e-13	-18.55588	-17.16597	-18.02855*
3	501.1786	15.51598	1.35e-13	-18.33382	-16.32618	-17.57212
4	533.5494	42.28018*	7.41e-14*	-19.00202*	-16.37663	-18.00595
5	542.5374	10.27196	1.11e-13	-18.71581	-15.47269	-17.48538

Post - NCA Period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	152.0907	NA	5.14e-11	-12.34089	-12.14455	-12.28880
1	269.6508	186.1369	1.11e-14	-20.80424	-19.82253	-20.54379
2	296.0068	32.94494	5.33e-15	-21.66723	-19.90015	-21.19843
3	335.1015	35.83681	1.12e-15	-23.59179	-21.03934	-22.91463
4	386.3434	29.89109*	1.44e-16*	-26.52861*	-23.19079*	-25.64309*

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

4.3. Co-integration Test Results

The third step of the Johansen Co-integration technique involves finding the number of co-integrated equations using trace statistics and maximum eigenvalue statistics. The probabilities given in tables 4 and 5, indicate that null hypothesis is not rejected since there is more than 1 co-integrated equations. In table 4 for the Pre-NCA period the trace statistics and maximum eigenvalue statistics both show that there is one (1) cointegrating equation among the variables in the Pre-NCA period and at most two (2) cointegrating equations amongst the variables in the Post-NCA period. Since the aim of the study is to find whether the National Credit Act had an impact on Household debt, this test should determine whether household debt (HHd), debt service coverage to disposable income (DSCY), household debt to disposable income (HHdY) and household disposable income (HHY) share common long run relationship(s). The test results of the Johansen cointegration (trace statistics and maximum eigen values) test results shown in table 4 and 5 show that there is one or more conitergrating vectors (error terms) in the model, therefore there exists a long run relationship among the variables. The acceptance or rejection of null hypothesis follows the p-value of each test statistic. If the p-value is less than 5%, the null hypothesis is rejected and when the p-value is more than 5% then the null hypothesis will not be rejected or we accept the null hypothesis. From the trace and maximum eigenvalue test results it is evident that we reject the null hypothesis and conclude that there is a long run relationship among the variables both in the Pre-NCA and Post-NCA period.

Table 4. Pre-NCA Period – Co-integration results

Pre-NCA period - Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.536157	59.73162	47.85613	0.0026
At most 1	0.237523	22.08934	29.79707	0.2936
At most 2	0.164127	8.801391	15.49471	0.3841
At most 3	0.000341	0.016722	3.841466	0.8970

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Pre-NCA period - Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.536157	37.64229	27.58434	0.0018
At most 1	0.237523	13.28795	21.13162	0.4261
At most 2	0.164127	8.784669	14.26460	0.3045
At most 3	0.000341	0.016722	3.841466	0.8970

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 5. Post NCA Period – Cointegration results

Post NCA Period - Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.955009	117.8694	47.85613	0.0000
At most 1 *	0.746323	43.43853	29.79707	0.0008
At most 2	0.354408	10.51791	15.49471	0.2430
At most 3	0.000659	0.015814	3.841466	0.8998

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Post NCA Period - Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.955009	74.43091	27.58434	0.0000
At most 1 *	0.746323	32.92062	21.13162	0.0007
At most 2	0.354408	10.50210	14.26460	0.1810
At most 3	0.000659	0.015814	3.841466	0.8998

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.4. Vector Error Correction Model (Short and Long run Results)

With evidence of co-integration found among the variables the next step is to augment the Johansen Co-integration tests with the Granger-type causality test model with a one period lagged error correction term (ECT). These causality testing procedures are done within the VECM framework proposed by Engle and Granger (1987). In this case the residuals from co-integration model equilibrium regression can be used to estimate the Vector Error Correction Model (VECM). Then the F-Test or WALD of the explanatory variables (in the first difference) are run for the short run causal effects. The long run causal relationships are derived through the significance of the lagged ECT which contains the long run co-integration. The Johansen co-integration test is not enough to describe fully the type of long-run and short-run causality relationships that exist among the variables. Therefore the Vector Error Correction Model causality test is done to capture both long-run and short-run relationships among the variables. The short-run causality is done through the WALD Chi-sqaure test because of its ability to show the extent of the strength of causality among the variables. The VECM based short-run and long-run Granger causality tests are presented in Table 6 and 7. The null hypothesis is the assertion that there is no causal relationship between tested variables and the alternative hypothesis is that there is a causal relationship between tested variables. This applies for both short run and long run tests.

The results from the vector error correction based causality test indicate in the short run a uni-directional causality in the Pre-NCA period (Table 6a) and bi-directional causality in the Post-NCA period (Table 6b) from household debt (LHHD) to household income (LHHY) which is significant at 5%. Thus the hypotheses that, (1) household debt does not granger cause household income and (2) household income does not granger cause household debt, is rejected. Therefore in the context of this study, the Pre-NCA period Household debt would increase disposable income but disposable income would not increase or decrease household debt, a clear sign that income was not a determinant for one's credit or loan affordability. However in the Post-NCA period there is a bi-directional relationship between household debt and disposable income, meaning that the debt taken by households was determined by the disposable income they have and more so the debt they have determines their disposable income. This is also a clear sign that the affordability rule put in the National Credit Act is working.

The other interesting result is of the relationship between the debt service coverage to disposable income ratio (LDSCY) and disposable income to household debt (LHHdY) both in the Pre-NCA and Post NCA periods. In the Pre-NCA period the relationship is uni-directional and in the Post-NCA it is non – existing. The implications are that in the Pre-NCA period, without stringent credit regulations, the more the household paid up their loans or debts the more they qualify for more debt, even though their disposable income is not increasing, since their household debt to disposable income ratio would improve indicating the ability to borrow more. However in the Post-NCA period in the short run there is no relationship between the improvements in the household debt service coverage to disposable

income ratio (LDSCY) and the household debt to disposable income ratio (LHHdY). The household's debt service coverage to disposable income ratio would not necessarily improve the household's debt to disposable income ratio. This is a clear indication of the maximum amount of money a household can afford given their disposable income curtailing the taking on of more debt rather than the ability to repay being a factor increasing the debt amount. The rule is that not more than R120,000 can be given as unsecured debt for individuals.

Table 6. Short Run Causality Test results

Pre-NCA Period

Null Hypothesis	Number of lags	Wald Test	Decision
LHHD does not granger cause LDSCY	4	2.003201 (0.7352)	Do not reject null hypothesis
LHHD does not granger cause LHHdY	4	4.720298 (0.3172)	Do not reject null hypothesis
LHHD does not granger cause LHHY	4	25.07499 (0.0008***)	Reject null hypothesis
LDSCY does not granger cause LHHD	4	4.254020 0.3727	Do not reject null hypothesis
LDSCY does not granger cause LHHdY	4	9.237129 (0.0554**)	Reject null hypothesis
LDSCY does not granger cause LHHY	4	3.558611 (0.4817)	Do not reject null hypothesis
LHHdY does not granger cause LHHD	4	0.838661 (0.933)2	Do not reject null hypothesis
LHHdY does not granger cause LDSCY	4	0.766642 (0.9429)	Do not reject null hypothesis
LHHdY does not granger cause LHHY	4	2.481270 (0.6480)	Do not reject null hypothesis
LHHY does not granger cause LHHD	4	6.768270 (0.1487)	Do not reject null hypothesis
LHHY does not granger cause LDSCY	4	1.574302 (0.8134)	Do not reject null hypothesis
LHHY does not granger cause LHHdY	4	9.083738 (0.0590**)	Reject null hypothesis

Post-NCA Period

Null Hypothesis	Number of lags	Wald Test	Decision
LHHD does not granger cause LDSCY	3	4.586270 (0.2047)	Do not reject null hypothesis
LHHD does not granger cause LHHdY	3	4.249473 (0.2358)	Do not reject null hypothesis
LHHD does not granger cause LHHY	3	39.48234 (0.0000***)	Reject null hypothesis
LDSCY does not granger cause LHHD	3	0.183626 (0.9802)	Do not reject null hypothesis
LDSCY does not granger cause LHHdY	3	14.33698 (0.0025)	Do not reject null hypothesis
LDSCY does not granger cause LHHY	3	5.292136 0.1516	Do not reject null hypothesis
LHHdY does not granger cause LHHD	3	5.934572 (0.1148)	Do not reject null hypothesis
LHHdY does not granger cause LDSCY	3	3.8752361 (0.2752)	Do not reject null hypothesis
LHHdY does not granger cause LHHY	3	6.518552 (0.0889***)	Reject null hypothesis
LHHY does not granger cause LHHD	3	30.21870 (0.0000***)	Reject null hypothesis
LHHY does not granger cause LDSCY	3	10.92228 (0.0122***)	Reject null hypothesis
LHHY does not granger cause LHHdY	3	7.079842 (0.0694***)	Reject null hypothesis

Wald Chi-Square tests reported with respect to short run change.
Values in parentheses, '()' are the probability of rejection of Granger non-causality
,*, indicates statistically significant at 10% and 5% respectively.

Conclusively in the short run tests, it is evident that the household's disposable income was now a major determinant of the household's affordability of debt. There is a uni-directional granger causality relationship between the household's disposable income (LHHY) to debt service coverage to disposable income ratio (LDSCY), Household debt to income ratio (LHHdY) and household debt in the Post-NCA period. In the Pre-NCA period household disposable income (LHHY) does not have any short run causality relationship with debt service coverage to disposable income ratio (LDSCY) and household debt to disposable income (LHHdY). This implies an insistence on household disposable income being the determining factor in granting debt to households in the Post-NCA period and non-insistence on the same in the Pre-NCA period.

In Table 7 the VECM based long-run causality tests with respect to equation 7 to 10 are presented. The analysis ascertains the existence of long run relationships between household debts (LHHD) to debt service coverage to disposable income (LDSCY) in the Pre-NCA period. The ECT_{t-1} for this long-run relationship is significant at 5% level. However, in the same period, the analysis of the movement of debt service coverage to disposable income ratio (DSCY) towards household debts indicates that there is no long run relationship. The analysis also in the same period indicates significant bi-directional long run relationship between household debt (LHHD) and household debt to income ratio (LHHdY). There is no significant long run relationship between household debt (LHHD) and household disposable income (LHHY). The implication of this relationship is to prove the relaxed credit granting conditions in the Pre-NCA period were the bi-directional long-run relationship between household debt (LHHD) and household debt to disposable income ratio (LHHdY) indicate that having more debt was not a factor in reducing or increasing once disposable income. This is also confirmed by the non-existence of long run relationship between household debt (LHHD) and disposable income (LHHY) in both directions, insisting that level of debt and disposable income a household had was not a limiting factor in getting more debt in the long run.

Table 7. Long run Estimates (Pre NCA and Post NCA periods)

Pre-NCA Period

Null Hypothesis	Number of lags	ECT_{t-1}	Decision
LHHD does not granger cause LDSCY	4	-0.000349*** (0.0248)	Reject null hypothesis
LDSCY does not granger cause LHHD	4	-0.039451 (0.4108	Do not reject null hypothesis
LHHD does not granger cause LHHdY	4	0.003668*** (0.0052)	Reject null hypothesis
LHHdY does not granger cause LHHD	4	-0.088675*** (0.0052)	Reject null hypothesis
LHHD does not granger cause LHHY	4	-0.025878*** (0.0192)	Do not reject null hypothesis
LHHY does not granger cause LHHD	4	-0.001691 (0.9553)	Do not reject null hypothesis

Post NCA period

Null Hypothesis	Number of lags	ECT_{t-1}	Decision
LHHD does not granger cause LDSCY	3	-0.013468 (0.2102)	Do not reject null hypothesis
LDSCY does not granger cause LHHD	3	-0.333154*** (0.0004)	Reject null hypothesis
LHHD does not granger cause LHHdY	3	-0.080517*** (0.0023)	Reject null hypothesis
LHHdY does not granger cause LHHD	3	-0.305935*** (0.0213)	Reject null hypothesis
LHHD does not granger cause LHHY	3	-0.262896*** (0.0001)	Reject Null hypothesis
LHHY does not granger cause LHHD	3	-0.273190 (0.4250)	Do not reject null hypothesis

Wald Chi-Square tests reported with respect to short run change.
Values in parentheses, '()' are the probability of rejection of Granger non-causality
***, indicates statistically significant at 10% and 5% respectively.

In Table 7b the results of the analysis of the long run relationships between the variables under study in the Post-NCA period is presented. There is a uni-directional long run relationship from debt service coverage to income ratio LDSCY) to household debt and no relationship as household debt (LHHD) moves towards debt service coverage to disposable income ratio (LDSCY). This result is

opposite of the same relationship in the Pre-NCA period. The implication is that in the Post-NCA period the debt service coverage to disposable income (LDSCY) determines the household debt (LHHD) in the long run which is an opposite in the Pre-NCA period were debt service coverage to disposable income had no impact on the household debt in the long run.

A bi-directional long run relationship between household debt (LHHD) and household debt to disposable income ratio (LHHdY) indicates that household debt would impact the amount of disposable income the household would be left with after taking debt. More so the household debt as percentage of disposable income would determine the amount of debt the household would take on. There is however a significant uni-direction causality of household debt (HHD) to disposable income (HHY) whilst there is no significant long run relationship as disposable income moves towards household debt. The implication is that income in the Post-NCA period, in the long run, is no longer an absolute determinant of the amount of debt a household could take on.

5. Conclusion

In summary, it is evident that the introduction of the National Credit Act managed to curtail reckless lending that was happening in the Pre-NCA period which was shown in the short run and long run results that the household income was not a major determinant of how much a household could get in debt. However in the Post-NCA period it was evident that the debt a household had was a major determinant in both the long run and short run. It is evident in this analysis that the National Credit has managed to stem reckless lending, however currently the unsecured lending book for the South African banks has increased as banks seek to circumvent the stringent lending criteria laid out in the NCA. Thus future research should seek to investigate the impact of unsecured lending and how innovative credit lending has circumvented the stringent lending regulations in NCA. More so the Credit Regulators should look into strengthening the NCA to cover these new innovative lending products that seek to circumvent the NCA strict granting procedures.

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