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Household Sector's Financial Sustainability in South Africa

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Abstract
The aim of this study was to examine the financial behaviour of the South African's household sector in respect of how households reacted to their aggregate debt position during the sample period 1990-2013. Following diagnostic evaluation of unit root and cointegration properties of the data series, a financial reaction function was estimated to analyse whether the households sector's financial behaviour was sustainable during the period under review. A typical four-variable framework of the Vector Error Correction Model (VECM) was estimated in E-views. In conformity to the lifecycle model, the results provide evidence that households actually historically behaved in a financially sustainable manner over the period 1990-2013.
Keywords: household, debt, saving, behaviour, sustainability, disposable income, net wealth

1. INTRODUCTION

In most economies globally, household debt has increased significantly; both in absolute terms and relative to household disposable incomes (Debelle, 2004). According to Prinsloo (2002), household debt-to-disposable income ratios provide as essential analytical tools in evaluation of households' financial conditions. Increased households' debt conveys risks to domestic financial stability. Moreover, the macroeconomic impacts of high household debt depend on the distribution of debt across the entire household sector. During periods of macroeconomic and structural imbalances, households with high debt levels suffer from higher exposure to financial distress relative to those with low debt levels. When household debt remains higher than savings; the economy's risk to financial instability increases.

The objective of this paper was to analyse how South African households reacted to their household debt positions during the period under review. The paper is organised as follows: Section 2 reviews literature and provides theoretical framework on household financial behaviour. Section 3 specifies the econometric methodology applied. Section 4 presents, analyses and interprets the findings; while Section 5 provides some concluding remarks and recommendations for further studies.

2. LITERATURE REVIEW

Understanding households' financial behaviour remains an important tool for addressing policy challenges related to financial markets developments and financial stability (Beckmann, Hake & Urvova, 2013). From an empirical outlook, most studies that have been undertaken on sustainability issues have focused on public debt and government fiscal behaviour rather than household financial sustainability. From the viewpoint of the household sector, some studies undertaken by Prinsloo (2002), Harjes & Ricci (2005), Aron & Muellbauer (2006), Aron, Muellbauer & Murphy (2006), Aaron, Muellbauer & Prinsloo (2007) and Muellbauer (2007) focused on the balance sheet composition of households, the determinants of saving and the impact of financial liberalisation on saving in the country. As a departure point, this study analyses household financial sustainability based on the lifecycle model.

Following the conceptual framework of lifecycle model, households' debt is determined by numerous factors such as expected future incomes, net worth and real interest rate. Given that financial markets are imperfect, the prevalence of asymmetric information between borrowers and lenders causes adverse selection and moral hazards difficulties (Rinaldi & Sanchis-Arellano (2006). Following Modigliani (1986) life-cycle model, households maximise utility subject to the budget constraint by smoothing consumption over time. To validate the model, household saving, consumption and disposable income should be cointegrated. In respect of debt, the lifecycle model can be formulated within the framework of two periods; current period (t) and future period (t+1), and with a default option such that households maximise their lifetime expected utility and consumption preferences following the specification:

$$V\left(C_t, C_{t+1}\right)=U\left(C_t\right)+\frac{1}{1+\delta}E\left[U\left(C_{t+1}\right)\right] \quad \text{---------- (1)}$$

where: C_t represents consumption in current period (t), δ denotes the subjective rate of time preference, E(•) is the expectation operator conditional upon information available in time period (t), and U represents the constant relative risk aversion utility function characterised by $U' > 0$, $U'' < 0$ and $U'(0)$ equal to ∞. Linking current consumption to current total income; which comprises of income from labour and own wealth, total income in future period remains uncertain, hence corresponding consumption also remains uncertain. Under such conditions, total income is assumed to be a stochastic process; with probability ρ period t+1 income equal to Y_L

(lower income) and probability 1-ρ period t+1 income equal to Y_H (high income); therefore households can borrow and lend at a risk free rate. Borrowers can thus increase current consumption by X_1 units by sacrificing X_2 of future consumption; with $x_2 = (1+R)x_1$.

3. ECONOMETRIC METHODOLOGY

3.1 Data

Quarterly time series data for the period 1990-2013 was gathered from the South African Reserve Bank (SARB) online macroeconomic indicators database. The data collected are the ratios of household debt-to-disposable income, household saving-to-disposable income and household net wealth-to-disposable income. Data on the output gap was computed using the Hodrick-Prescott filter in E-views.

3.2 Unit Root Tests

The ADF approach was used to perform unit root tests on data in levels and first difference, with both intercept and trend. The tests were done following the specification:

$$\Delta y_i = \beta_1 + \delta y_{i-1} + \sum_{j=1}^{p-1} a_j \Delta y_{i-j} + \varepsilon_i \quad \text{---------- (2)}$$

where: ε_i represents a pure white noise error term, $\Delta y_{i-j} = y_{i-1} - y_{i-2}$ and p denotes the class of autoregression; the null hypothesis being $\delta = 0$. The ADF tests with trend followed the regression below:

$$\Delta y_i = \beta_1 + \beta_2 t + \delta y_{i-1} + \sum_{j=1}^{p-1} a_j \Delta y_{i-j} + \varepsilon_i \quad \text{---------- (3)}$$

where: t represents the time or trend variable; with the null hypothesis being $\delta = 0$.

3.3 Cointegration Tests

The cointegration tests were performed using the maximum likelihood methodology.

$$\lambda_{max} = -T \log\left(1 - \lambda_{r+1}\right) \quad \text{---------- (4)}$$

where: the null hypothesis r ≤ g cointegrating vectors was tested against its alternative r = g + 1.

3.4 Estimation Procedure

A Vector Error Correction Model (VECM) was applied to test for household financial sustainability. Denoting the ratios of household debt-to-disposable income, household saving-to-disposable income and household net wealth-to-disposable income by D/Y, S/Y and A/Y; respectively, the household financial behaviour was analysed using a financial reaction function specified as below:

$$\left(S/Y\right)_t = \theta_1 + \theta_2\left(S/Y\right)_{t-1} + \theta_3\left(D/Y\right)_{t-1} + \theta_4\left(A/Y\right)_{t-1} + \theta_5\left(\hat{y}\right)_{t-1} \quad \text{---------- (5)}$$

To estimate the VEC model, the ϑ parameter was decomposed into the given α and β matrices:

$$\vartheta X_{t-1}\ \alpha\beta' X_{t-1} = \begin{bmatrix}\alpha_{11}\\ \alpha_{21}\\ \alpha_{31}\\ \alpha_{41}\end{bmatrix}\begin{bmatrix}1 & \beta_{21} & \beta_{31} & \beta_{41}\end{bmatrix}\begin{bmatrix}(S/Y)_{t-1}\\ (D/Y)_{t-1}\\ (A/Y)_{t-1}\\ (Y\_gap)_{t-1}\end{bmatrix} \quad \text{---------- (6)}$$

where: α denotes a 4x1 matrix of four variables and one cointegrating relationship. The matrix contains error correction parameters; and β' is a 4x4 matrix of the long run parameters:

$$(S/Y)_{t-1} = \beta_{12}(D/Y)_{t-1} + \beta_{31}(A/Y)_{t-1} + \beta_{41}(Y\_gap)_{t-1} \quad \text{---------- (9)}$$

4. RESULTS AND DISCUSSION

Table 1: Unit Root Test Results

	Level	First Difference
S/Y	-2.854359	-11.64537***
D/Y	-2.443048	-4.895755*
A/Y	-3.581272	-6.543768***

***;**; * denote significance at 1 percent, 5 percent and 10 percent levels; respectively.

The results indicate that although none of variables was stationary at level, household saving and household net wealth are I(1) at 1 percent level; while household debt was stationary at 10 percent level.

Table 2: Johansen Cointegration with Linear Deterministic Trend - Lag Interval: 1 to 1

Eigenvalue and L.R. Test Statistics			
H_0	r = 0	r ≤ 1	r ≤ 2
H_1	r = 1	r = 2	r = 3
Eigenvalue	0.328133	0.118944	0.018453
L.R. statistic	35.48207*	9.742368	1.347879
*(**) denotes rejection of the null hypothesis at 5% (1%) significance level			
Critical Values			
1% Sig. level	35.66	20.14	6.65
5% Sig. level	29.76	15.42	3.76

The maximum eigenvalue and likelihood ratio test results confirm existence of one cointegrating relationship. The household financial reaction function (Table 3) was estimated using the Vector Error Correction (VEC) model.

Table 3: VECM Results

Cointegrating Equation:				
log(S/Y (-1))	1			
log(D/Y (-1))	0.421145			
	[210349]			
log(A/Y (-1))	-0.096764			
	[-1.93242]			
log(Y_gap(-1))	-1.472837			
	[-2.17965]			
Error Correction Equations	dlog(S/Y)	dlog(D/Y)	dlog(A/Y)	dlog(Y_gap)
Error Correction Term	-0.117505	-0.110118	1.479863	0.056862
	[-2.76600]	[-1.42376]	[2.47205]	[2.11017]
dlog(S/Y (-1))	-0.483478	0.310940	-0.758285	0.067294
	[-3.46062]	[1.85346]	[-0.73527]	[1.77262]
dlog(D/Y (-1))	-0.086413	0.221253	2.241535	0.034909
	[-0.96163]	[1.60338]	[2.38444]	[1.27815]
dlog(A/Y (-1))	0.009811	-0.014768	-0.034636	0.014716
	[0.87705]	[-0.93113]	[-0.13237]	[0.95006]
dlog(Y_gap (-1))	-0.371012	0.243533	0.164233	0.489139
	[-1.63229]	[0.63161]	[0.05905]	[4.32242]
Adj. R-squared	0.218912	-0.017915	0.099724	0.369011
Sum sq. resids	59.27186	123.8420	6544.864	11.65409
S.E. equation	0.977751	1.413312	10.27435	0.433554
F-statistic	5.624372	0.709611	2.827707	10.64941

The VEC model results on the long run component of the cointegration equation indicate that for every 1 percent increase in the household debt-to-disposable income, the household saving-to-disposable income decreases by approximately 0.42 percent. Given the vector representation of the cointegrating equation, the positive sign in front of the parameter of long run component of the cointegrating equation portrays a negative relationship between the variable to which the parameter relates and the variable on which the vector is normalized. With the VEC model being normalized on household saving-to-disposable income ratio, the positive sign in front of the household debt-to-disposable income ratio therefore implies a negative relationship; while the negative sign in front of the household net wealth-to-disposable income ratio represents a positive relationship

between household net wealth and household saving. Following the statistical significance of results, the parameters for household debt-to-disposable income ratio and household net wealth-to-disposable income ratio in the long run component of the model designate that households react to their net financial position.

Moreover, the error correction term in the short run component of the model reveals that nearly 11.8 percent of the deviation from the long run equilibrium path is corrected in the first quarter after the deviation occurs. The estimated error correction term shows the correct sign and the sign is also statistically significant; confirming existence of the long run relationship. Moreover, the relatively low value of the error correction term divulges a satisfactory rate of convergence to the long-run equilibrium. Therefore, the error correction term shows that variations in household saving-to-disposable income ratio adjust to shocks in the long run relationship. While the error correction term for the household debt-to-disposable income ratio is statistically insignificant, the error correction terms for household wealth-to-disposable income ratio and output are statistically significant. Also, the respective error correction terms have the right signs, given their corresponding signs in the long run component of the model.

5. CONCLUSION AND RECOMMENDATIONS FOR FURTHER RESEARCH

5.1 Conclusion

The objective of this paper was to analyse the households' financial behaviour with regards to the manner in which they historically reacted to their household debt positions. The analysis of the respective household's sector financial behaviour was done through estimation of a saving reaction function developed in form of the Vector Error Correction model. The estimated function measured the reaction of the household saving-to-disposable income ratio to changes in the household debt-to-disposable income ratio and household net wealth-to-disposable income ratio. The estimated empirical results conform to the propositions of the lifecycle model; indicating that the South African household sector behaved in a financially sustainable manner during the period under review.

5.2 Recommendation for Further Research

Both household debt and household saving are important macroeconomic variables for enhancing macroeconomic and financial stability. From the financial market development and financial stability perspective, saving alone plays an indispensable part in the economy through the monetary transmission mechanism. Given that households are heterogeneous in respect of size, net wealth, preferences and spending behaviour; examining households' financial behaviour at aggregate level disregards many aspects that are potentially important in understanding their financial behaviour. In that respect, future research should analyse households' financial behaviour at a more disaggregated level to further evaluate the possible repercussions such might have on both macroeconomic and financial sector stability.

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