HOUSEHOLDS SAVINGS AND INFLATION EXPECTATIONS: COINTEGRATED EVIDENCE FROM SOUTH AFRICA

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Abstract

The main aim of this paper is to find out if expected inflation by different sectors has a long-run effect on household savings in South Africa for the period 2002Q1 to 2013Q4. This is established using cointegration and innovation accounting techniques (variance decomposition and impulse response functions). Prior to the establishment of such relationship, the time series properties of data are performed and this include, the unit root test (Zivot-Andrews) in order to establish the stationarity within the series. The cointegration test reveals the existence of the long-run relationship between household savings and expected inflation in South Africa. Innovation accounting techniques indicated a significant contribution of the explanatory variables to household savings. VD shows that inflation expectations from analysis (A), business (B), finance (F) as well as trade unions (TU) bring some innovations into HHS and that variations in HHS are largely due to changes in expected inflation from TU. This is also supported by the GIRFs, which indicate that HHS reacts to shocks in expected inflation.

***Keywords**: Household Savings, Expected inflation, Cointegration, Innovation accounting, South Africa*

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1 Introduction

Household savings is defined as that portion of the disposable income that is not utilised for final consumption expenditure. Savings from the households' perspective should start within ourselves and should be taught to children at a very young age. This statement is enhanced by Bucciol and Veronesi (2014) in their paper on teaching children to save. The lack of savings by South Africans saw an establishment of the South African Savings Institute (SASI) in 2001 with a mandate of developing a robust culture of saving in the economy. There are several factors that could impede household savings, some of which include the consumer perception about future inflation. The economy of South Africa like the rest of the world is still recovering from the recent financial crisis, which was reflected in low economic performance and high unemployment but also through low savings.

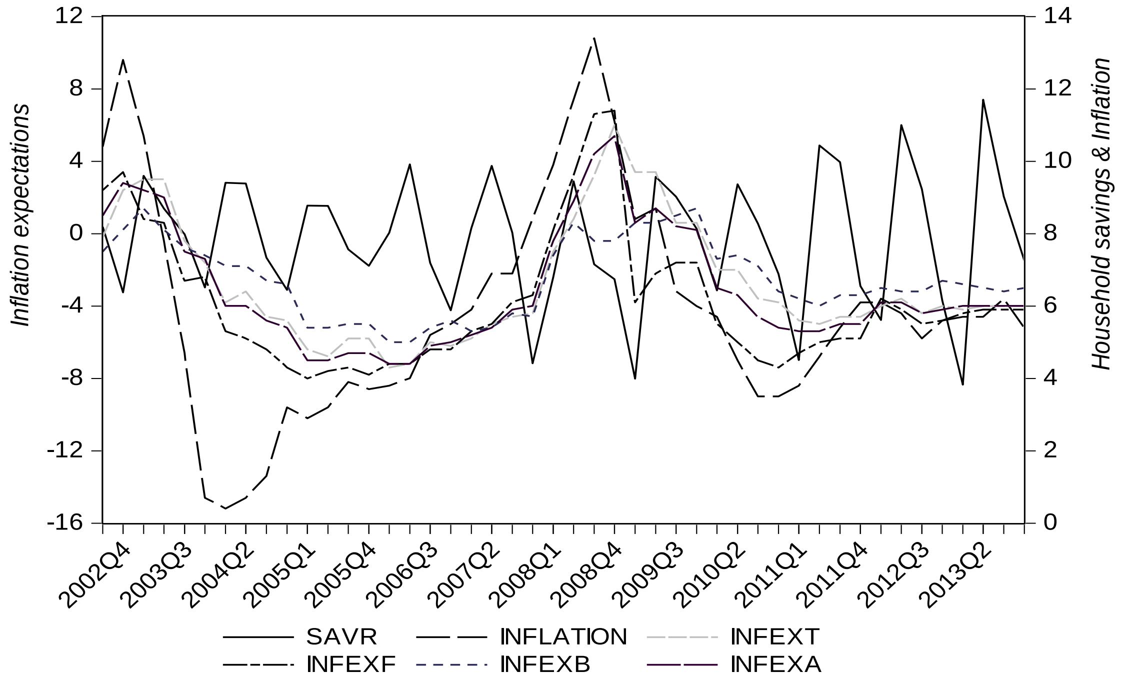
Many South Africans seem not to be saving enough, whether for future consumption or investment and as a result resort to borrowing. The households savings were recorded at -0.3 percent of gross domestic product (GDP) in 2009, while savings available to fund investment in new capital stock stood at about 2 percent (SARB, 2010). A further declining pattern of savings seems to still exists and this is a concern for the country as a whole, because of the link between savings and investment and possibly other macro-variables such as current account. Low levels of savings are insufficient to finance investment projects and this pushes the economy into deficit.

2 Theoretical and empirical underpinnings of savings

There is a huge literature, both theoretical as well as empirical of savings and consumptions patterns. This stems from the Ando-Modigliani approach dubbed permanent income hypothesis (PIH) as well as the Friedman approach dubbed the life-cycle hypothesis (LCH). The LCH postulates that a typical individual's income stream is low at early ages and towards end of her life (Branson,1989). This theory suggests that nations with a large portion of the population in the retired or younger age groups lead to a high dependency ratio and experience low levels of savings (Dirschmid and Glatzer, 2004). There is much abstruseness pertaining to the variables that are expected to affect household savings.

Several studies including among others, Ismail and Rashid (2013), Horioka and Wan (2007), Athukorala and Tsai (2003), Hondroyiannis (2004) have established a negative relationship between household savings and inflation. Although these studies have made such contribution to the literature, they have not tried to investigate the impact or effect of expected inflation of household savings. This left the gap in literature, as household's perception of future inflation does influence their savings pattern in the long run. A high rate of inflation leads to uncertainty about financial returns as thus result in lower savings rate, suggesting a negative relationship between inflation and household savings.

Figure 1. Household savings and inflation



Household savings and savings theory in general seems to differ from the LCH by proposing that households save not only for their retirement ages and suave consumption but also for precautionary purposes. This was also asserted by Carrol (1996), who indicated that savings are also used as a safeguard stock. Apart from the above mentioned theories, there follows a Ricardian equivalence (RE) theorem which asserts that huge fiscal deficits are likely to induce an increase in household savings because households would anticipate future increases in taxes (Dirschmid and Glatzer, 2004). This therefore according to RE, a rise in household savings will be able to offset fully the fiscal dissaving in the long run.

Several empirical have been conducted on the savings pattern and determinants but the majority considered among the determinants of savings, the inflation but excluded the inflation expectations. Such papers include, Narayan and Narayan (2006), Hondroyiannis (2004), Mishra and Chang (2009), Jordan and Treisch (2010), Amoateng (2006), Niculescu-Aron and Mihăescu (2012, 2014), Chamon *et al* (2013), Salotti (2010), Alessie, Angelini and Santen (2013), Heer and Süssmuth (2007), Van de Ven (2011), Guven (2014) and Feng *et al*(2011). Natayan and Natayan (2006) investigates the long and short-run savings in Fiji using the bounds test approach to cointegration. Their model includes real rate of interest, income, CADs and age dependency ratio. The results revealed that economic growth raises savings in bothe the long and short run, while on the other hand CAD and interest rate influence savings negatively. Mishra and Chang (2009) investigated the factors affecting precautionary savings of self-employed households and using the double-hurdle method found that there was reasonable evidence that higher income households save more and accumulate more wealth. Jordan and Treisch (2010) on one hand allude that savings does not depend on tax concessions. Amoateng (2002) established the cointegration between savings, stock returns and family homes and found stock returns exerted negatively on savings. This

The most notable studies on savings in South Africa include Odhiambo (2007 and 2009), Mahlo (2011), du Plessis (2008), Simleit *et al* (2011), Precious and Asrat (2014). These and other studies had regressed savings on explanatory variables such as economic growth, interest rates, fiscal deficit, financial liberalisation as well as inflation. They have all ignored inflation expectations as a factor to household savings. In view of these studies and those of the rest of the world, the paper seeks to unleash the long-run effect of inflation expectations on household savings in South Africa.

3 Research method and analysis

The study uses time series quarterly data covering the period 2002 to 2013 for South Africa. The variables, household savings, economic growth (proxy for wealth), employment, inflation and inflation expectations from different sectors of the economy enter the model based on the literature. The general dynamic model used in the study is:

$$HHS_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} HHS_{t-i} + \sum_{i=0}^{k} \beta_{ti} \Gamma_{t-i} + \delta_0 D_t + \omega_t \qquad (1)$$

Where HHS = household savings, Γ_{t-i} represents a set of all explanatory variables to be included in the model and their lags (thus, GDPG = economic growth, EMPG = employment growth, RIR = real interest rate, INFL_A = inflation expectation by all, INFL_B = inflation expectation by businesses, INFL_TU = expected inflation by trade unions, INFL_F = expected inflation by finance as well as INFL = inflation). D_t represents a set of deterministic terms, which include dummies, trends), while ω_t is a white-noise error term.

$$\Gamma_t = \delta_0 D_t + \delta_1 \Gamma_{t-1} + \delta_2 \Gamma_{t-2} + \dots\dots\dots\dots\dots + \delta_k \Gamma_{t-k} + \pi_t \qquad (2)$$

$$\Gamma_t = \delta_0 D_t + \sum_{i=1}^{k} \delta_i \Gamma_{t-i} + \pi_t \qquad (3)$$

$\sum_{i=1}^{k} \delta_i \Gamma_{t-i}$ is the summation of vector of lagged endogenous variables in the system. Γ_t is a nx1column vector of all variables that enter system, D_t is a vector holding deterministic terms (intercepts, trends, dummies, and so forth), π_t = nx1 dimensional vector of multivariate random errors with mean zero and covariance matrix Ω, thus error terms are assumed contemporaneously correlated but not autocorrelated, δ_i = matrices of coefficients to estimated. The assumptions of the model are stated as: $\boldsymbol{\pi}_t \sim N(\mathbf{0},\boldsymbol{\Omega})$, with $E(\boldsymbol{\pi}_t \boldsymbol{\pi}_s^{'}) = 0$ and

$$E(\boldsymbol{\pi}_t \boldsymbol{\pi}_t^{'}) = \boldsymbol{\Omega} = \begin{bmatrix} w_{11} w_{12} \dots & w_{1n} \\ . \quad . \quad . & . \\ . \quad . \quad . & . \\ . \quad . \quad . & . \\ w_{n1} w_{n2} . & w_{nn} \end{bmatrix}$$

Where w_{ii} = var (ε_{it}) and Ω represents the covariance matrix cov($\varepsilon_{it}\varepsilon_{jt}$). The existence of the long-run relationship compels us to detect the short-run dynamics within the model and the short-run model is therefore given below.

$$\Delta\Gamma_t = \psi D_t + H\Gamma_{t-1} + \Theta_1 \Delta\Gamma_{t-1} + \Theta_2 \Delta\Gamma_{t-2} + \dots\dots\dots\dots\dots + \Theta_{k-1}\Gamma_{t-k+1} + \pi_t \qquad (4)$$

$$\Delta_t \Gamma = \psi D_t + \sum_{i=1}^{k-1} \Theta_i \Delta\Gamma_{t-i} + H\Gamma_{t-1} + \Theta_{k-1}\Gamma_{t-k+1} + \pi_t \qquad (5)$$

Where matrix $H = \boldsymbol{\alpha}.\boldsymbol{\beta}^{'}$ (thus H is decomposed into two matrices of dimensions [n x r], and r is the number of cointegrating vectors), α is a matrix of adjustment coefficients or the loading matrix and contains the short run dynamics while β is the matrix containing the long run equilibrium relationships or long run coefficients.

3.1 The nature of data and variables used in the study

In this paper we consider the effect of inflationary expectations on household savings in South Africa and we utilise different aggregate inflation expectations as well as expectations of three agents: business, trade unions and analysts (including economists). The data for these expectations are obtained from the Bureau of Economic Research

(BER). The BER conducts a survey in South Africa where major market participants are asked questions about the prospect of inflation. The sample is from the third quarter of 2002 to the fourth quarter of 2013.

The nature of data for respective variables used in the study is summarized in Table 1 below. The residuals from some of the variables in level form do not satisfy the normality test. From the descriptive statistics, it is observed that the null-hypothesis that residuals from economic growth (GDPG), employment (EMP), expected inflation by all sectors (INFE_A), expected inflation by trade unions and expected inflation business (INFE_F) variables are normally distributed cannot be rejected at 5 percent level of significance (indicated by low p-value of Jarque-Bera statistic[1]), while for households savings (HHS), expected inflation by business (INFE_B) as well as real rate of interest (RIR) such hypothesis is rejected at 5 percent level of significance, hence residuals from these variables are normally distributed. The non-normality of residuals from the former variables might be due to the observed structural breaks and the presence of outliers present in the data of such variables, which therefore indicated that, in testing for stationarity of such variables, structural breaks and outliers had to be accounted for, lest false conclusions are drawn using conversional unit root tests.

3.2 Estimation procedure and time series properties of data

The core of regression analysis is in part to estimate the long-run and short-run meaningful economic relationships in order to test existing theoretical hypothesis. In doing so, the underlying data generating process of variables needs to be investigated in order to circumvent the likelihood of false conclusions resulting from spurious correlation (Granger and Newbold, 1974) between variables in a regression equation, where what actually exists is co-movement between variables (time trends) over time rather than any meaningful economic relationship (Charemza, 1990; Granger and Newbold, 1986; Stock and Watson, 1988). Thus for any time series based economic study, it becomes principally important to account for non-stationarity of variables.

Differencing of such non-stationary series to attain stationarity had always been a major weapon in the Box-Jenkins approach. However, Sims (1980) argues that such differencing leads to a loss of long-run properties of data, and such trends should as well be modeled. This gave rise to the subject of cointegration and VAR modeling. However, prior to testing for cointegration and VAR modeling, time series data must to be tested for stationarity.

The most notable tests include the ADF proposed by Dickey and Fuller (1979) as well as the PP by Phillips and Perron (1988), but these tests do not take into account the structural breaks in the series. It is expected that during the sample period selected for the study, major economic happenings would have been occurred which could have generated potential non-stationarity in the series. Such non-stationarity could have potential implications for under or over estimation of the results. In order to overcome such issues, the Zivot – Andrews (ZAU)[2] structural break test has been conducted. Table 2 below shows the results of the unit root tests applied in this study.

The lag length selection for the series was determined by Akaike information criterion (AIC) as presented in table 3 below. All variables include the constant term. It is noted from the results that only employment and inflation expectation by trade union are stationary while the rest of the variables (households savings, economic growth, inflation expectation for financial analysis, inflation expectation by all surveyed participants and inflation) contain unit root. The ADF test on the other hand reveals that only expected inflation for financial analysis contains unit root. Due to the macroeconomic activities that could have occurred during the time frame for the analysis, stationarity test would be judged on the test that accommodates such structural breaks.

3.3 Cointegration analyses

The idea of cointegration analysis stems from the view that, although economic time series display non-stationary behaviour, a linear amalgamation among these non-stationary variables may be stationary. The essence of conducting the cointegrating analysis is basically to test the presence of long-run relationships among variables, and in multivariate models, to estimate long-run parameters βs (cointegrating vectors), to estimate long-run coefficients of adjustments αs (loading coefficients), and to employ long-run information to estimate VECMs, which describe short-run dynamics.

Several tests and procedures have been proposed in literature to test for cointegration between variables. The most celebrated of these tests are the Engle-Granger (EG) test, the Augmented Engle-Granger (AEG) test, the Cointegration Regression Durbin-Watson (CRDW) test, the Autoregressive Distributed Lag (ADL) model approach and lastly the Johansen maximum likelihood test of cointegration within VAR framework. While the ADL and VAR approaches to cointegration are appropriate for cases where more than two variables are cointegrated in the

[1] This statistic proposed by Jarque-Bera (1982) is used to test for normality of residuals and is computed as $JB = [n/6SK^2 + n/24(EK-3)^2]$, where n=number of observations, SK= a measure of skewedness of the distribution, and EK= measure of kurtosis of the distribution

[2] Zivot and Andrews (1992)

regression (that is where there are more than one cointegrating vector), the former three are only appropriate for two variable cases (only when the assumption is made of one cointegrating vector).

Table 1. Descriptive statistics for variables used in the study

Variable	*HHS*	*INFE_A*	*INFE_B*	*INFE_F*	*INFE_TU*	*RIR*	*EMPG*	*GGDP*
Mean	-0.308465	6.438636	6.727273	6.031818	6.602273	7.664015	0.614709	3.338636
Median	0.046884	6.000000	6.550000	5.500000	6.000000	7.201667	0.375282	3.350000
Maximum	7.401824	10.70000	8.700000	11.40000	11.00000	12.56667	11.56107	7.400000
Minimum	-8.356918	4.400000	5.000000	4.000000	4.300000	4.953333	-1.538462	-6.300000
Std. Dev.	3.711072	1.660515	1.081206	1.827283	1.700956	2.159480	2.093330	2.641372
Skewness	-0.275995	0.930452	0.218253	1.428822	0.907063	0.746146	3.889731	-1.255927
Kurtosis	2.588435	2.843479	1.958586	4.544874	2.767050	2.593551	19.80804	5.749314
Jarque-Bera	0.869145	6.393684	2.337647	19.34674	6.133079	4.385586	628.8885	25.42492
Probability	0.647541	0.040891	0.310732	0.000063	0.046582	0.111605	0.000000	0.000003
Sum	-13.57245	283.3000	296.0000	265.4000	290.5000	337.2167	27.04719	146.9000
Sum Sq. Dev.	592.1982	118.5643	50.26727	143.5755	124.4098	200.5242	188.4273	300.0043
Obser.	44	44	44	44	44	44	44	44

Source: Author

Table 2. ZAU unit root test and ADF unit root test results

	ZAU Test	**ADF Test**	
Variables	*ZA Statistic*	*ADF Statistic*	*5% Critical value*
HHS_t	-3.9598	-3.9598	-2.9331
EMP_t	-6.9305	-6.2043	-2.9314
$GDPG_t$	-4.1833	-3.0483	-2.9281
$INFEA_{t+1}$	-4.3769	-3.0298	-2.9314
$INFETU_{t+1}$	-5.7456	-3.4535	-2.9314
$INFEF_{t+1}$	-2.9503	-2.3899	-2.9281
$INFEB_{t+1}$	-4.2716	-3.5010	-2.9389
RIR_t	-4.3249	-2.9614	-2.9297

Note: the 5% critical value for the ZA unit root is -4.93

Table 3. Lag length selection

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
1	-291.7075	NA	0.039890	16.61988	18.66780*	17.36562
2	-238.1565	70.53059	0.038110	16.39788	20.49373	17.88936
3	-157.0864	79.09272*	0.013807*	14.83348*	20.97727	17.07071*

Due to limitations inherent in the first three tests, the study employed Johansen maximum likelihood test of cointegration proposed and developed by Johansen (1988) and applied in Johansen and Juselious (1990), within the VAR approach. The whole mark of this test depends heavily on the relationship between the rank of a matrix and its characteristic roots. Therefore, the statistical hypothesis under cointegration is H(p): rank(Π) $\leq$ r, where r is the rank of the long-run matrix Π. Johansen *et al* (1990) advocate two tests statistics to use in order to decide on the number of characteristic roots that are insignificantly different from unity: the trace test and the maximum eigen-value test. Formally stated these statistics are:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \tag{5}$$

$$\lambda_{\max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \tag{6}$$

Where $\hat{\lambda}_i$ = the estimated values of the characteristic roots (also known as eigen-values) obtained from the estimated Π matrix, T = the number of usable observations.

The first statistic in equation (5) tests the null hypothesis that the number of distinct cointegrating vectors is less than or equal to r, against a general alternative that it is not equal to r. Whereas the second statistics in equation (6) tests the null hypothesis that the number of cointegrating vectors is r, against the alternative of (r + 1). Generally, the $\lambda_{\max}$ statistics is usually more preferred for trying to pin down the number of cointegrating vectors, since it has a shaper alternative.

Within VAR framework, the long-run weak exogeneity test was carried out through the restricted VAR model in order to evaluate explicitly those variables that could be regarded exogenous to private capital formation variable. The null hypothesis of the exogeneity test was H_0: Variable is exogenous to private capital formation, against an alternative hypothesis of no exogeneity.

Table 4 (a). Cointegration analysis and testing for cointegration rank (r): 2002Q3 – 2013Q4
(results for maximum eigenvalue test)

Null Hypothesis	*Alternative Hypothesis*	*Eigenvalue*	*Trace Statistic*	*95 CV*	*Probability*
H_0: r = 0	H_1: r ≥ 1	0.888080	213.0905	125.6154	0.0000*
r ≤ 1	r ≥ 2	0.644976	123.3018	95.75366	0.0002*
r ≤ 2	r ≥ 3	0.528229	80.84347	69.81889	0.0051*
r ≤ 3	r ≥ 4	0.433998	50.04174	47.85613	0.0307**
r ≤ 4	r ≥ 5	0.380230	26.70625	29.79707	0.1090
r ≤ 5	r ≥ 6	0.148094	7.091539	15.49471	0.5670
r ≤ 6	r ≥ 7	0.012606	0.520113	3.841466	0.4708

Table 4 (b). Cointegration analysis, and testing for cointegration rank (r): 2002Q3- 2013Q4
(results for maximum eigenvalue test)

Null Hypothesis	*Alternative Hypothesis*	*Eigenvalue*	*λ_{max} Statistic*	*95 CV*	*Probability*
H_0: r = 0	H_1: r = 1	0.888080	89.78871	46.23142	0.0000*
r = 1	r = 2	0.644976	42.45835	40.07757	0.0265**
r = 2	r = 3	0.528229	30.80173	33.87687	0.1115
r = 3	r = 4	0.433998	23.33548	27.58434	0.1596
r = 4	r = 5	0.380230	19.61471	21.13162	0.0804
r = 5	r = 6	0.148094	6.571426	14.26460	0.5410
r = 6	r = 7	0.012606	0.520113	3.841466	0.4708

Notes: (i) Asterisks **and * indicate significant at 5% and 1% level of significance respectively.

(ii) Although, the trace statistics is tabulated above, it is not used in deciding the number of Cointegrating vectors because of its lack of exactness, therefore decisions are based on the Maximum Eigenvalue Statistics, which is preferred over the former because of its exactness on the alternative hypothesis.

(iii) "CV" denotes critical value.

(iv) The critical values for the λ_{max} Statistic are tabulated in Johansen and Juselius (1990) and reproduced in Enders (1995:420).

Table 4 (i). The normalized unrestricted cointegrating vectors (the β′ matrix)

	HHS	*INFEXA*	*INFEXB*	*INFEXF*	*INFEXT*	*GGDP*	*EMPG*
$\beta_1^{'}$	1.000000	0.000000	0.000000	0.000000	0.950549	1.070449	-2.085692
					(0.38485)	(0.29897)	(0.40330)
$\beta_2^{'}$	0.000000	1.000000	0.000000	0.000000	-0.661321	0.466572	-1.002833
					(0.19047)	(0.14796)	(0.19959)
$\beta_3^{'}$	0.000000	0.000000	1.000000	0.000000	-0.291805	0.458607	-0.665201
					(0.15442)	(0.11996)	(0.16182)
$\beta_4^{'}$	0.000000	0.000000	0.000000	1.000000	-0.284593	1.078398	-2.339977
					(0.43047)	(0.33441)	(0.45110)

Table 4 (ii). The unrestricted long-run adjustment coefficients matrix (the α matrix)

	α_1	α_2	α_3	α_4
HHS	-2.637961(0.29033)	4.378705 (6.20759)	0.625638(1.20029)	0.374434 (2.49008)
INFEXA	-0.181935(0.09473)	-5.438601(2.02537)	0.643435(0.39162)	2.304322(0.81244)
INFEXB	-0.069198(0.06427)	-1.773102(1.37410)	-0.341019 (0.26569)	0.951532(0.55120)
INFEXF	-0.226650(0.14225)	-7.710498(3.04157)	1.226385(0.58811)	3.118586(1.22008)
INFEXT	-0.226079 (0.08347)	-3.505139(1.78468)	0.423964(0.34508)	1.590236(0.71590)
GGDP	0.029793(0.20819)	8.690906(4.45136)	-2.184878(0.86071)	-3.345049(1.78559)
EMPG	0.001875(0.30616)	-12.71307(6.54620)	1.626154(1.26576)	5.541374(2.62590)

Note: Values in parenthesis are the conversional t-values

In order to identify the unique Eigenvector, the trend in the first standardized β^1 Eigenvector was restricted to zero and the first variable in the first restricted to one, while in the second Eigenvector, we only restricted the standardized variable in the first vector to zero in the second vector and the vector itself to one, see results above.

Interestingly, the adjustment coefficients of the α matrix appear with negative signs for the first five variables in the first column corresponding to the first cointegrating vector while for second cointegrating vector, are all consistent with theory. Nevertheless, some of the error correction terms in appear with some dominant long-run feedback effects in the households savings equation, expected inflation from finance, output equation and employment equation especially for the second cointegrating vector. This is noted from largest magnitudes of the adjustment coefficients and their conversional t-values. Moreover, some of the adjustment coefficients reported above infer some information about long-run weak exogeneity of variables. Therefore, it was necessary to perform the formal tests for long-run weak exogeneity of variables and the results for this test are reported in Table 5. In carrying out this test, the intention was to test if variables can be classified as long-run weak exogenous to the household savings equation.

Table 5. Testing for long-run weak exogeneity between variables

Variable Name	*Chi^2*	*Probability*	*Decision*	*Inference*
ΔINFEXA	0.814335	0.6655	Acceptance	EX
ΔINFEXB	1.114599	0.5728	Acceptance	EX
ΔINFEXF	0.129445	0.9373	Acceptance	EX
ΔINFEXT	2.224172	0.3289	Acceptance	EX
ΔGGDP	11.96076	0.0025*	Rejection	N/EX
ΔEMPG	0.257294	0.8793	Acceptance	EX

Note: N/EX indicates not exogenous to household's savings equation and EX indicates exogenous to households savings equation; Asterisk * indicates 1% significance level

The results in Table 5 above, indicate that the null hypothesis of the long-run weak exogeneity of variables to household's savings is accepted for five variables; INFEXA, INFEXB, INFEXF, INFEXT and EMPG but rejected for GGDP. This implies that the former five variables can be restricted to enter the cointegrating vector, as exogenous variables while GGDP cannot.

In the previous section above, it was noted that the variables are cointegrated with rank order 4, which implied that there were four long-run relationships among the variables or four cointegrating vectors, and such relationships were thereafter discussed, particularly that with respect household savings in South Africa. The innovation accounting results are presented in table 6 below.

Table 6. Innovation accounting analysis

Table 6 (a). Generalised impulse response functions (GIRF): household savings

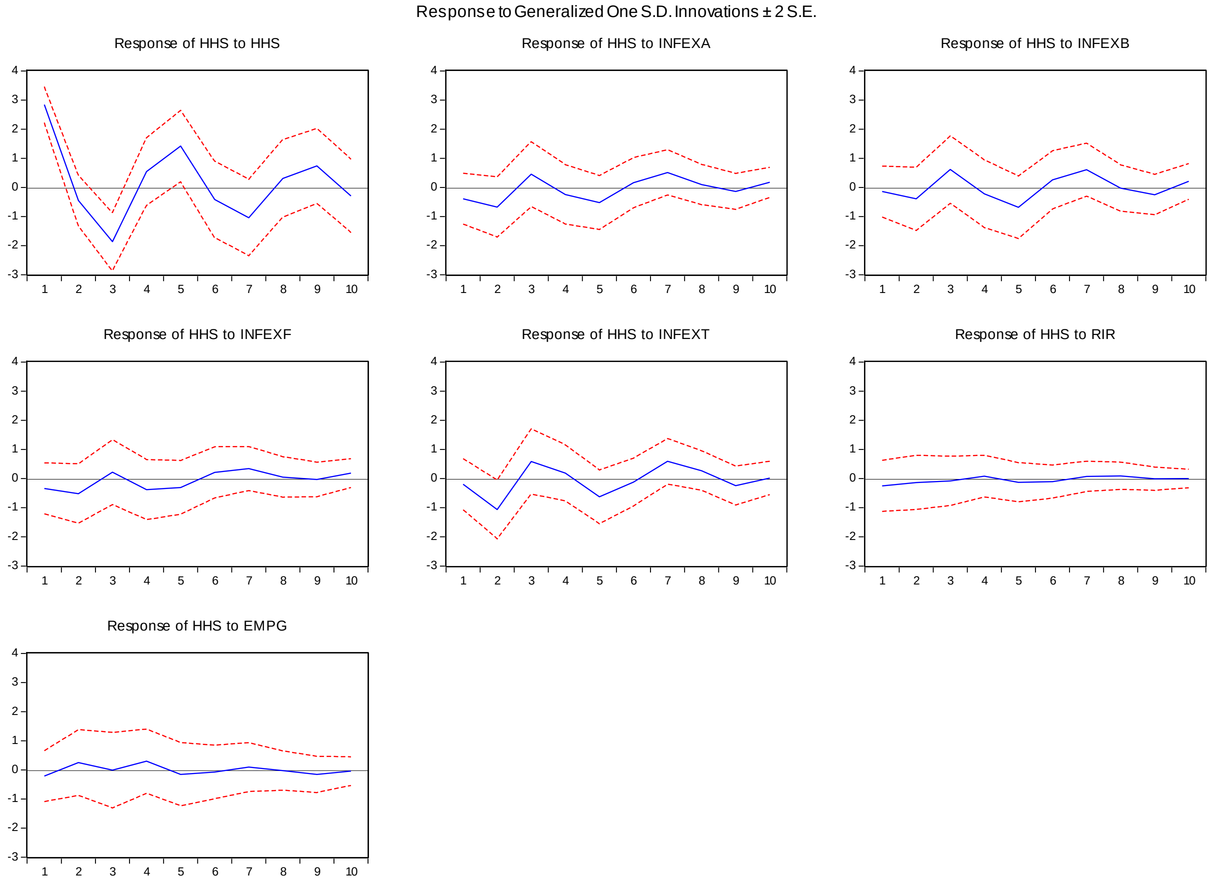


Table 6 (b). Variance decomposition (VD) of household savings

Period	S.E.	HHS	INFEXA	INFEXB	INFEXF	INFEXT	RIR	EMPG
1	2.839236	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	3.171697	82.14824	5.535386	0.107594	3.953971	8.022933	0.231440	0.000434
3	3.803553	81.22649	4.118487	1.919212	3.286578	8.386085	0.992957	0.070188
4	3.969078	76.44104	3.969144	1.842288	6.727024	9.511888	0.927335	0.581283
5	4.303379	75.88630	3.968609	3.098227	5.950072	9.704546	0.828369	0.563877
6	4.375330	74.31282	3.896032	3.248834	6.990349	10.15400	0.803437	0.594524
7	4.562868	73.53276	4.243137	3.816876	6.503941	10.50641	0.791534	0.605343
8	4.597120	72.88176	4.271321	3.858111	6.859657	10.74755	0.779812	0.601784
9	4.681383	72.74602	4.126960	4.010671	6.730204	10.92817	0.795507	0.662473
10	4.704882	72.42317	4.163435	4.053706	6.943371	10.95678	0.790664	0.668875

4 Conclusions

This study empirically tests the existence of long-run relationship between household savings and expected inflation in South Africa using the quarterly data spanning from 2002 to 2013. The econometrics analysis requires the establishment of the properties of data and this was performed to ascertain if such data contains unit root or not. The results presented in table 2 indicate that the variables are integrated of order 1. This was revealed by both the ADF and the ZAU tests. Unlike other studies that seem to ignore the presence of structural breaks in the series when testing for unit root, this paper decided to take a twist and establish the unit root test using ZAU test. The test also justifies the presence of unit root and hence variables are I~(1).

Using the Johansen[3] cointegration test to test the existence of long-run relationship between household savings and expected inflation in South Africa, the study finds that there is considerable long-run. The innovation accounting techniques, on one hand reveal a contributory impact of expected inflation on household savings. The VD suggest that variations in HHS are largely due to changes in expected inflation (attributable to A, B, F as well as TU). This indicates that although expected inflation by TU account for about 8 percent in the initial stages, it did get the momentum as times went by, with expected inflation accounting for about 11 percent to shocks HHS. The GIRF also confirmed that inflation expectations do cause some negative shocks on HHS. The study results also suggest that inflation expectation is a more reliable tool to forecast HHS as opposed to inflation.

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[3] See Johansen (1998). Statistical analysis of Cointegrating Vectors. Journal of Economic Dynamics and Control, vol. 12, pp. 231 -254.