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Budget deficit and long-term interest rates in South Africa

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This paper investigated the extent of the effects of the systematic and surprise changes in budget deficits on the long-term interest rate in South Africa. Use was made of the identified cointegrating vector autoregressive (VAR) techniques whereby cointegrating vectors were identified based on the Fisher effect theory and the expectation hypothesis of the term structure to assess the effect of systematic changes in budget deficit on the long-term interest rate. Moreover, the generalised impulse response functions obtained from the cointegrating VAR were used to assess the effect of the surprise change in budget deficit on the long-term interest rate. The results of the paper showed a positive relationship between the budget deficits and long-term interest rate under different assumptions of price expectations by economic agents.

Key words: Budget deficit, cointegrating vector autoregressive (VAR), Fisher effect, inflation expectations.

INTRODUCTION

An important issue in public finance is whether the increase in budget deficit leads to an increase in interest rates. Moreover, a number of studies contend that examining the effect of budget deficits on long-term rather than short-term interest rates seems desirable for a number of reasons. For example, Kiani (2009) indicates that long-term interest rates are more relevant in terms of the issue of crowding out hypothesis.

Furthermore, the author denotes that the influence of the short-term interest rate imposed by the central bank should obscure the possible short-term effect of the budget deficit, while long-term rates are less influenced by the actions of the monetary authority. On the importance of the relationship between budget deficits, long-term interest rates and the crowding-out hypothesis, Chopin et al. (1997) show that if a positive relationship between the governments budget deficit and long-term interest rates exists, then higher deficits would crowd out private spending and slow down economic growth.

In contrast, if deficit financing has no effect on long-term interest rates, then deficit spending instead may promote economic growth. Taylor (1995) contends that the crowding out hypothesis should be related to the

effect of budget deficits on the long-term rather than short-term interest rates. The author shows that there is an a priori reason to believe that for long-term decisions like investing in plant and equipment, the long-term interest rate should be a variable of greater interest. Furthermore, empirical evidence suggests that in South Africa private investment is more sensitive to long-term interest rates than short-term interest rates (Le Roux and Ismail, 2004). This indicates that private investment is more sensitive to long-term rather than short-term interest rates.

Given the fact that the monetary authority controls the short-term interest rates and thus the short end of the yield curve, a study on how budget deficit (fiscal authority) affects the long-term interest rate should provides insights into how the monetary-fiscal mix can twist the yield curve for the benefit of the economy. The failure of 'the operation twist' in the US, characterised by the use only of monetary policy to shift the slope of the yield curve, indicates the importance of a more coordinated monetary-fiscal policy collaboration for a successful attempt to shift the slope of the yield curve, and, thus, stimulate the economy. Given the findings of a

number of studies that the inverted yield curve predicts recession in many countries (Estrella and Trubin, 206; Estrella and Mishkin, 1998), the possibility of twisting the yield curve through a monetary-fiscal policy mix can provide a way of escaping or limiting the duration of recession in these countries.

This paper assesses the relationship between the long-term interest rate and budget deficit in the context of the loanable funds theory of interest rate. According to the loanable funds theory, interest rate is determined in terms of the demand and supply of funds available for lending (Cebula, 1999). Because governments borrow, mostly in the capital market, to finance budget deficits, government borrowing leads to an increase in the demand for loanable funds, and a reduction of available loanable funds to finance private investment. Thus, the increase in the demand for loans, as a result of government borrowing, should lead to an increase in the price of loans (interest rate) and a likely decrease in private investment. Another advantage of using a loanable funds model that provides an interaction between long-term and short-term interest is that, apart from assessing the effect of fiscal stimulus on long-term interest rate, the model can also provide information about the relationship between short- and long-term interest rates, and, thus, the characteristic of the term structure of interest rate in South Africa. For example, a positive relationship between long- and short-term interest rates should support the expectation theory of the term structure of interest rates, and, thus, the possibility of the monetary authority influencing long-term interest rates.

The analysis in this paper differs from a number of studies that assess the effect of budget deficit on interest rates in South Africa in that it assesses the long-run effect of the budget deficits on long-term interest rates rather than on short-term interest rates. In addition, this paper assesses the dynamic effects of the long-term interest rates on budget deficit shocks by making use of the generalised impulse response function. Thus, the contribution of the paper is twofold. First, the paper will assess the effect of a systematic change to budget deficit on the long-term interest rate. Then, the effect of the surprise change to budget deficit on the dynamic of the long-term interest rate will also be considered.

The paper is structured as follows: Subsequently, the study reviews the literature on the relationship between interest rate and budget deficit in the context of the crowding-out effect. After which it presents the methodology for assessing the relationship between interest rate and budget deficit. This is followed by discussing the results of the empirical analysis, and finally it was concluded the paper.

LITERATURE REVIEW

The relationship between the budget deficit and interest rate, and thus, its implications for the crowding-out effect,

can be described in terms of different theoretical models. The standard Hicksian IS-LM model shows that the increase in government spending that results in budget deficit shifts the IS curve to the right and results in the increase in interest rate. In this framework, it is often assumed that for the crowding-out effect to occur the LM curve should be perfectly inelastic (constant money supply). With a vertical LM curve, the expansionary fiscal action will result in an increase in interest rate but will fail to stimulate total economic activities, as the total income will remain constant. The resulting zero government spending multiplier means that increased government demand crowds out exactly the same amount of private demand.

However, Friedman (1972) shows that the slope of the LM curves are irrelevant to the crowding-out effect. For the author, an expansionary fiscal policy might first be reflected in an increase in output, but the financing of the deficit (tax- or debt-financed expenditure) would set in motion contractionary forces that could offset the initial increase in output.

David and Scadding (1974) use the IS-LM framework to show that an extra dollar of government deficit displaces a dollar of private investment expenditure. For the authors, a tax-financed expenditure has a displacement effect on private consumption that offsets the increase in government spending. Given this reality, fiscal actions have no effect on the IS curve and aggregate demand. With the Keynesian assumption of liquidity trap, represented by a perfectly elastic LM curve, it is assumed that expansionary fiscal policy should result in the right shift of the IS curve and an increase in total output. This shows that in Keynesian economics, the crowding-out effect may not occur.

Another important theoretical model from which the relationship between the budget deficit and interest rate, and thus the crowding-out effect, can be described is the Ricardian equivalence proposition (REP).

Barro (1989), in support of the Ricardian equivalence proposition (REP), shows that if households are fully rational and take the welfare of their descendants into account in formulating their consumption and savings patterns, a decrease in taxes (that results in budget deficit) in one period would be balanced by offsetting increases in private saving in the same period. In particular, households would recognise that the reduction in taxes today would increase future tax liabilities and therefore save the tax cut. Thus, the implication of the REP is that an increase in the budget deficit is neutral on national saving and interest rate. Likewise, an increase in government expenditure, according to the REP, will decrease private consumption and increase private saving (Feldstein and Elmendorf, 1990). The consequence of the REP is that an increase in government expenditure is offset by a decrease in private consumption and results in a neutral effect in the total demand and output.

The relationship between interest rate and budget

deficit can also be described under the loanable fund theory. According to this theory, interest rate is determined in terms of the demand and supply of funds available for lending (Cebula, 1988). Because the decision to invest (demand for funds) and the decision to save (supply of funds) are long-term decisions, the loanable funds theory provides a framework to determine the level of long-term interest rate given the interaction between the demand and supply of loans.

Moreover, the loanable funds theory provides a generic framework whereby the implication of other theories, such as the REP, can be inferred. For example, Kiani (2009) shows that if agents are Ricardian, the increase in the demand for funds as a consequence of government budget deficit is offset by the increase in private saving (supply of funds), leaving the long-term interest rate unchanged, as predicted by the REP.

Different functional forms are used to represent the relationship between the budget deficit and long-term interest rate within the context of the loanable funds theory. Sargent (1969) provides a model for interest rate determination where the nominal bond rate (the long-term interest rate) is a function of anticipated inflation, budget deficit, changes in real money supply and income. In the functional form proposed by Sargent (1969), changes in the real money supply capture the impact of monetary policy actions. Mehra (1994) modified Sargent's model by replacing money supply with the federal funds rate to represent the instrument of monetary policy.

Using cointegration regression, Mehra (1994) shows that the bond rate is positively correlated with inflation and the budget deficit in the long run. However, the author indicates that if the cointegration regression is re-estimated under the restriction that the bond rate adjusts one-for-one with inflation, the long-run relationship between the bond rate and budget deficits weakens.

Cebula (1999) applies an open-economy loanable funds model to assess whether a long-run relationship exists between budget deficits and long-term interest rates in the United Kingdom (UK) in the period from 1972 to 1991.

In Cebula's model, the nominal long-term interest rate is a function of the expected future inflation, *ex ante* real short-term interest rate, the percent change in real gross domestic product, the real net capital flow and the real net borrowing by the central government. Cebula (1999) finds that there was a long-term positive relationship between the nominal long-term interest rate and budget deficit in the UK from 1972 to 1991.

Kiani (2009) investigates whether the emergence of high inflation rate after 1965 in the US and large budget deficits in the 1980s caused the financial market agents to become more sensitive to the outlook for inflation and budget deficits. In his study, the author evaluates the impact of budget deficits on long-term interest rates within the context of the loanable funds theory. The author suggests a model for long-term interest rate determination, where the long-term interest rates are a function of an *ex ante* real short-term interest rate, expected inflation, a variable representing economic activity (represented by output gap) and budget deficits.

Kiani (2009) showed that there was a link between budget deficits and the slope of the yield curve in the US from 1962 to 2005. This result indicates that economic agents are becoming more sensitive to the outlook of budget deficits in the US.

To the best of our knowledge, there is no study that analyses the relationship between the long-term interest rate and the budget deficit in South Africa in the context of the loanable funds theory. Nonetheless, Akinboade (2004) uses the London school method and Granger causality test to determine the relationship between the budget deficits and short-term interest rates. The author finds that budget deficits do not influence interest rates in South Africa.

Uwilingiye and Gupta (2007) verify the claim made by Akinboade (2004) using Granger causality and cointegration analysis. The authors focused on the relationship between the short-term interest rate and budget deficits and found that the causal relationship between the short-term interest rate and budget deficit depends on the periodicity of the data.

DATA ANALYSIS AND METHODOLOGY

The empirical tests carried out in this paper are in line with the loanable funds model proposed by Mehra (1994), where the long-term interest rate is a function of the short-term interest rate, expected inflation, real deficit and income. Nonetheless, the loanable model proposed in this paper measures expected inflation in two ways. The first measure relies on adaptive expectation in constructing the time series of expected inflation. The rationale of adaptive expectation relates the attitude of many economic agents in that they adjust their expectation once the most recent actual value differs from the previously expected value. The second measure of expected inflation, which is based on forward-looking perfect foresight hypothesis, assumes that $E_t(P_{t+1}) = P_{t+1}$.

Expected inflation time series derived from the survey method are available in South Africa. However, this time series dates back only to November 2000, and again would not be appropriate for this particular study. It is worth noting that the results of surveys on household inflation expectations in South Africa indicate that households formulate their inflation expectations differently (Rossouw, 2009). Inflation expectations by households vary according to the gender and location of people surveyed. This is a clear indication that different assumptions need to be considered when formulating inflation expectations in South Africa.

The method used to test for cointegration and to estimate the cointegrating vector is the vector autoregressive (VAR) maximum likelihood technique outlined by Johansen and Juselius (1990).

The vector $X_t = [iL_t, iS_t, bud_t, Ep_t, y_t]$,

Where iL_t, iS_t, bud_t, Ep_t and Y_t represent the nominal long-term interest rate, nominal short-term interest, ratio of government budget deficit by gross domestic product, expected

price and real GDP, respectively. Ep_t is decomposed into Ep_t^1 and Ep_t^2, which represent the expected inflation time series obtained from adaptive and perfect foresight expectations, respectively. The VAR system is represented as

$$X_t = \mu + \sum_{i=1}^{n-1} \Pi_i X_{t-i} + \varepsilon_t \qquad (1)$$

Where Π_i is a $n \times n$ matrix of parameters, μ is a constant term and $\varepsilon_t \approx iid(0, \Omega)$. The VAR system of Expression (1) can be rewritten as a vector error correction model (VECM) in the form of Expression (2):

$$\Delta X_t = \mu + \Pi X_{t-1} + \sum_{i=1}^{n-1} \Gamma_i \Delta X_{t-i} + \varepsilon_t \qquad (2)$$

Where Γ_i is the parameter of short-term coefficients and Δ is an expression for first difference series. The rank of Π, r, determines how many linear combinations of Z_t are stationary.

With r cointegrating vectors, one can factorise Π as $\Pi = \alpha\beta'$, where both α and β are $(N \times r)$ matrices, and β contains the cointegrating vectors and α the adjustment parameter. The rank of Π is assessed based on two tests on the characteristic roots of Π. The first test, known as the Max-eigenvalue test, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis that there are $r+1$ cointegrating vectors. The second test, the trace statistic, tests the null hypothesis that the number of cointegrating vectors is less than or equal to r.

This paper applies restrictions to the cointegration vector to identify the Fisher effect in the cointegration relationship. According to the Fisher effect, there should be a one-to-one relationship between the nominal interest rate and the expected price. This paper estimates the cointegrating vector under the restriction that the long-term interest rate adjusts one for one with expected inflation in the long run.

Moreover, the paper makes use of the generalised impulse response analysis in a cointegrated VAR model to assess mainly the dynamic response of long-term interest rate to budget deficit shocks. It is important to note that, contrary to orthogonalised impulse response, the generalised impulse response does not depend on the order of variables included in a specific vector. It provides an important tool to analyse the dynamics in a time series model by representing the reaction of variables to specific shocks.

Koop et al. (1996) show that if X_t is first-difference stationary, ΔX_t can be written as the infinite moving average representation.

$$\Delta X_t = \sum_{j=0}^{\infty} C_j \varepsilon_{t-j} \qquad (3)$$

Where Cj represents a $p \times p$ matrix. Assuming that ε_t has a multivariate normal distribution, Koop et al. (1996) show that $E(\varepsilon_t / \varepsilon_{jt} = \delta_j) = \sum e_j \sigma_{jj}^{-1} \delta_j$; thus, the generalised impulse

response (GIR) in a cointegrated VAR is given as

$$GIR(h, \delta, \Omega_{t-1}) = E(X_{t+h} / \varepsilon_t = \delta, \Omega_{t-1}) - E(X_{t+n} / \Omega_{t-1}) = \beta' C_h \sum e_j \sigma_{jj}^{-1} \delta_j$$
$$(4)$$

Where h is the forecast horizon, δ determines the size of shock hitting the economy, e_j is a $m \times 1$ selection vector with unity as its jth element and zero elsewhere and $E(\varepsilon_t \varepsilon_t') = \sum = \sigma_{ij}$

EMPIRICAL ANALYSIS AND RESULTS

This paper made use of quarterly data from 1970Q3 to 2008Q3 to assess the relationship between the long-term interest rate and budget deficits within the framework of multivariate cointegration. The end of the sample selection corresponds to the period before the effect of the 2008 global financial crisis on the South African economy. Table 1 shows the variables used for model specification. All the variables were sourced from the I-Net Bridge database. Table 2 presents the results of the unit root test of all the time series data. The paper employed the Augmented Dickey-Fuller (ADF) methodology in testing the null hypothesis of unit root on the time series data.

The results of the stationarity test show that all the series are I (1) at the 99% level of confidence. This paves the way for the application of Johansen's cointegration test to assess the relationship between the different variables of interest.

To test the number of cointegration relationships in $X_t = [iL_t, iS_t, bud_t, Ep_t^2, y_t]$, the paper set up an initial VAR and included a constant and a dummy variable as deterministic term that takes the value of zero before 1995 and unit afterward.

Tswamuno (2007) shows that the South African government lifted all controls on non-resident investors in March 1995, allowing them full access to the Johannesburg Securities Exchange (JSE) and the South African Bond Exchange (SABE). This move resulted in an increase in bond purchases. The increase in bond purchases has had an effect on the yield on government bonds. The second dummy variable included in the VAR specification accounts for the change in monetary policy regime with the adoption of explicit inflation targeting in 2000.

Before proceeding with the lag length selection of the VAR process, the paper tested the null hypothesis of the deletion of the dummy variable included in the VAR model. The likelihood ratio (LR) test of restriction with $\chi^2(5) = 4.3846$ showed that the null hypothesis of variable deletion is not rejected. Thus, the paper opted not to include the dummy variables in the VAR model.

Furthermore, the lag length of the VAR process, $p = 1$, was selected using the Hannan-Quinn (HQ) information

Table 1. Data description.

y_t	The log of real GDP at market price
Ep_t^1	Expected inflation obtained from adaptive expectation
Ep_t^2	Expected inflation obtained from perfect foresight
iS_t	Prime overdraft rate
iL_t	RSA yield on 10–year government bond
bud_t	Ratio budget deficit by GDP

Table 2. Unit root test of different series: DF-GLS test statistic.

Variables	Level	First difference	Order of integration
y_t	-0.976	-11.221*	I(1)
Ep_t^1	-2.7352	-10.4691*	I(1)
Ep_t^2	-3.3018**	-11.7308*	I(1)
bud_t	-2.228	-27.38*	I(1)
iS_t	-2.5824	-8.9901	I(1)
iL_t	-2.099	-11.9013	I(1)

*and ** indicate rejection of the null hypothesis of unit root at 1% and 5% levels, respectively.

criteria. The Lagrange multiplier (LM)-test with $\chi^2(4)=$ 3.10 indicates that the null hypothesis of serial correlation is not rejected.

The results of the trace and Max-eigenvalue tests of the null hypothesis of cointegration between variables are reported in Tables 3 and 4.

The results of the cointegration tests pointed to the existence of three cointegrating equations. The paper identified two of the relationships as the Fisher effect, which assumes a one-to-one relationship between the short-term nominal interest rate and expected inflation in the first relationship as well as a one-to-one relationship between the long-term nominal interest rate and expected inflation in the second relationship. The third relationship identified the expectation hypothesis of the term structure of interest, with a one-to-one relationship between long-term and short-term interest rates.

The estimation of the cointegrating relations for

$$X_{1t} = \left[iL_t, \ iS_t, bud_t, Ep_t^2, y_t \right]$$ and

$$X_{2t} = \left[iL_t, \ iS_t, bud_t, Ep_t^2, y_t \right], \quad \text{respectively,} \quad \text{by}$$

imposing over-identification restrictions is reported in Tables 5 and 6. The results reported in Table 5 showed that the imposed restrictions in $X_{1t} = \left[iL_t, \ iS_t, bud_t, Ep_t^2, y_t \right]$ were not rejected given the $\chi^2(1)$ statistics of 0.000764. From vector 1 in Table 5, the results indicated a positive relationship between long-term interest rate and budget deficit under the hypothesis of perfect foresight. Moreover, the results reported in Table 6 indicated the positive relationship between the budget deficit and long-term interest rate under the adaptive expectation hypothesis, and the restrictions imposed on $X_{2t} = \left[iL_t, \ iS_t, bud_t, Ep_t^2, y_t \right]$ were not rejected given the $\chi^2(1)$ statistics of 0.0260 with a p-value of 0.872.

The magnitude of the impact of budget deficit on the long-term interest rate was less under the inflation perfect foresight hypothesis than under the adaptive expectation. This was certainly due to a possible attempt by economic agents to mitigate the effect of budget deficit on future generations, as predicted by the Ricardian Equivalence

Table 3. Trace test for cointegration.

Null	Alternative	statistic	95% critical value	90% critical value
r = 0	r ≥ 1	390.3	75.98	71.81
r ≤ 1	r ≥ 2	201.34	53.48	49.95
r ≤ 2	r ≥ 3	64.4	34.87	31.93
r ≤ 3	r ≥ 4	13.28	20.18	17.88
r ≤ 4	r = 5	3.79	9.16	7.5

Table 4. Maximum Eigenvalue test for cointegration.

Null	Alternative	statistic	95% critical value	90% critical value
r = 0	r ≥ 1	189.03	34.4	31.73
r ≤ 1	r ≥ 2	136.93	28.27	25.8
r ≤ 2	r ≥ 3	51.12	22.04	19.86
r ≤ 3	r ≥ 4	9.48	15.87	13.81
r ≤ 4	r = 5	3.79	9.16	7.5

Table 5. Imposed restrictions on $X_{1t} = \left[iL_t,\, iS_t, bud_t, Ep_t^2, y_t \right]$.

	Vector 1	Vector 2	Vector 3
Ep_t^2	1	-1	53.63
y_t	2.31**	0	0.17
bud_t	3.78*	0	0
iS_t	0	1	1
iL_t	-1	0.918*	-1

* and **denotes significance at 1% and 5% level respectively. The LR statistic for testing the over-identifying restriction is given by $\chi^2(1) =$ 0.000764, with a *p*-value of 0.993

hypothesis. Nonetheless, the full Ricardian hypothesis did not hold in South Africa, given the positive reaction of budget deficit to long-term interest rate. Thus, the results showed that systematic changes to the budget deficit in South Africa had a positive effect on long-term interest rates.

In assessing the effect of surprise change or shocks to budget deficit on long-term interest rates in South Africa, this paper made use of the generalised impulse response functions obtained from the cointegrating VAR estimation reported in Tables 5 and 6. As stated earlier, the advantage of the generalised over the orthogonalised impulse response functions is that the results obtained from the generalised impulse response function are invariant in relation to the order of the variables in a given vector representation.

Figure 1 depicted the impulse response functions of long-term and short-term interest rates to one standard deviation shock to budget deficits under perfect foresight inflation expectation. The time horizon considered for assessing the effect of the innovation to budget deficits on the short- and long-term interest rates was 8 quarters, which is appropriately the time period for evaluating the effects of shocks on budget deficit.

The results of the IRF in Figure 1 indicated that the response of the long-term interest rate to shocks to budget is positive, and overshoots the response of the short-term interest rate to the same shocks. Moreover, while the impulse response function of the short-term interest rate died out after almost 2 quarters, the response of the long-term interest rate was persistent for 8 quarters. This indicates the tendency of the budget deficit to influence the long-term rather than the short-term interest rates. As stated earlier, sort-term interest rates are influenced to a greater extent by monetary policy.

Table 6. Imposed restrictions on $X_{1t} = \left[iL_t, \ iS_t, bud_t, Ep_t^1, y_t \right]$.

	Vector 1	Vector 2	Vector 3
Ep_t^1	1	-1	92.33
y_t	2.47**	0	0.17
bud_t	4.14*	0	0
iS_t	0	1	1
iL_t	-1	0.922*	-1

* and **denotes significance at 1% and 5% level respectively. The LR statistic for testing the over-identifying restriction is given by $\chi^2(1) = 0.0260$ with a p-value of 0.872.
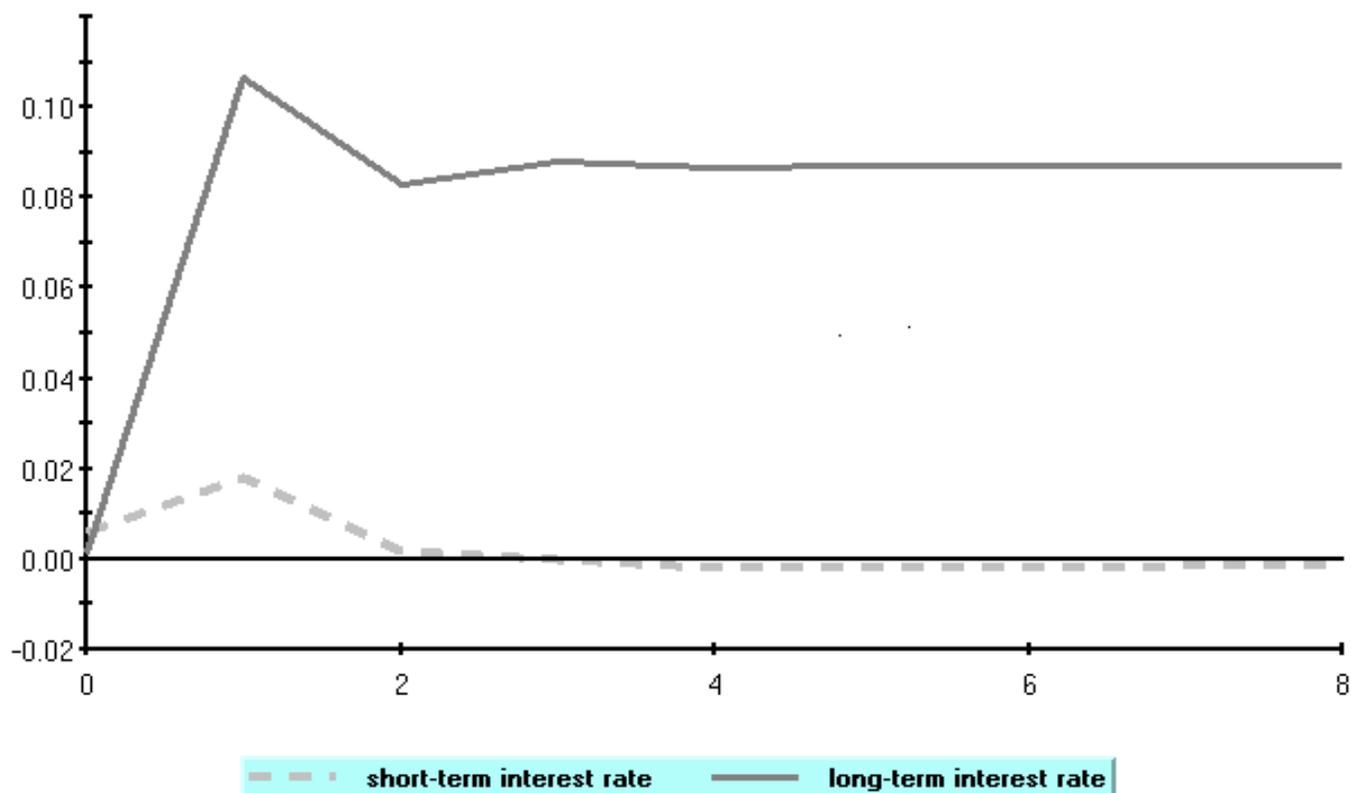

Figure 1. Impulse response function of short- and long-term interest rates to one standard deviation shock to budget deficit.

The finding that systematic and surprise changes to budget deficit influenced positively the long-term interest rates in South Africa should have implications for the extent of the expansionary fiscal policy, characterised by high budget deficits, on economic activities. With the evidence that economic decisions depended mainly on longer yields (Bernanke and Gertler, 1995), the observed positive response of the long-term interest rate to changes in budget deficit indicated the possibility of a crowding-out effect in South Africa. In fact, an expansionary fiscal policy in South Africa, characterised by an increase in budget deficit, is likely to increase the

long-term interest rate, and, thus, depress private investment and economic activities in the long term.

Moreover, the findings of this paper that long-term interest rates responded positively to systematic and surprise changes to the budget deficit should indicate that the reaction of long-term interest rates to the change of interest rates is invariant in fiscal regimes in South Africa. A discretionary fiscal regime is characterised by unanticipated or surprise changes in fiscal variables, while in a fiscal rule regime the changes in fiscal variables are anticipated. Nonetheless, this paper showed that long-term interest rates reacted positively to changes in budget deficit, whether these changes were anticipated or unanticipated.

Another important finding is the positive relationship between the short- and long-term interest rates in South Africa, reported in the third cointegration vector (equations) in Tables 5 and 6. This finding not only indicated that the expectation theory of the term structure held in South Africa, but also offered insights into the possibility of the monetary-fiscal policy mix twisting the yield curve in South Africa. For example, by decreasing the short-term interest rate, the monetary authority could mitigate the effect of increasing long-term interest rates due to an expansionary fiscal policy.

Conclusion

This paper assessed the effects of systematic and surprise changes to budget deficit on long-term interest rates in South Africa. Use was made of the cointegration VAR approach whereby restrictions based on the Fisher effect hypothesis and the expectation theory of the term structure were applied to three identified cointegrating vectors.

The results of the paper showed the positive response of the long-term interest rates to systematic and surprise changes to budget deficit. Moreover, the results of the paper showed that the response of the long-term interest to shocks to budget deficit overshoot the response of the short-term interest rate to the same shocks. This indicates the tendency of the budget deficit to influence long-term rather than short-term interest rates.

The positive response of the long-term interest rate to systematic and surprise changes to budget deficit indicated that the reaction of the long-term interest rate to changes in budget deficit is invariant in relation to the type of fiscal regime in South Africa.

Moreover, the positive relationship between the short- and long-term interest rates reported in this paper not only supports the expectation theory of the term structure, but also gives insight into the possibility of the

monetary-fiscal policy mix twisting the yield curve in South Africa.

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