

POLICY EFFECTIVENESS IN THE SOUTH AFRICAN ECONOMY

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Abstract

In recent years, the government of South Africa has made substantial efforts to bolster that nation's economy, by implementing reforms in several areas. This paper employs Romer's (2000) IS-MP-IA model, with Hsing's (2004) extension, to examine the co-movement in macroeconomic aggregates in the South African economy, to evaluate the effectiveness of these policies and highlight areas of potential improvement. Findings suggest that South Africa is vulnerable to changes in expectations regarding inflation, with a one percent increase in expected inflation decreasing equilibrium real GDP by 0.5%. This implies that the central bank's current commitment to credibility is well founded. Moreover, increases in the stock market and decreases in the deficit have positive and significant effects on GDP. Exchange rate fluctuations, however, are found to have little effect on real GDP.

Introduction

While the performance of the South African economy has been better than much of the continent, it has not been stellar. This paper addresses the effectiveness of macroeconomic policy reforms in achieving the goal of growth in national income. Among the tools at a government's disposal are fiscal policy (taxing and spending) and monetary policy (inflation and depreciations). Also available are more structural policies aimed at increasing transparency in the capital markets, as higher rates of expected return in the stock markets funnels

productive funds into the economy. Reducing exchange controls allows for increased capital mobility, and with the right conditions attracts foreign investment. Each of these would be expected to have positive effects on income and output.

According to the International Monetary Fund's (IMF's) International Financial Statistics (IFS) database, South Africa's budget deficit to GDP ratio has been declining from a peak of 8% in 1994 to a very respectable 0.5% by 2002. Broadly speaking, changes in interest rates in South Africa follow the world rate. However, the spread between the two rates has been steadily increasing since 1975. As of 2004, the interest rate spread between the two countries is approximately 10%. According to an IMF (2003) staff report, investment in South Africa is critically dependent on foreign direct investment into the country, as domestic saving is non-existent. With large reported capital flight, the interest rate spread between the domestic and world markets is a manifestation of the South African Reserve Bank's attempt to attract foreign dollars into the country. This has proven difficult, as foreign investors remain skittish of instability in the region, and of the slow progress of the privatization program that had been promised in 2000. Despite this, South Africa's Johannesburg Stock Exchange (JSE) saw sustained growth over the last decade. After reaching a high of 193 in 2002q2 (relative to its base of 100 in 1995) the JSE index retreated to 169 in 2003q4. This is a respectable 8% yearly rate of growth, as compared to the roughly 9.5% growth in the Dow Jones Industrial Average over the same time period.

South Africa's GDP underwent a severe contraction between the years 1990-1992, experiencing, not just a reduction in its growth rate, but negative rates or growth for all three of these years. This was likely due in part to South Africa's adjustment to a post-Apartheid economy during the years 1990-1994. By 1994, South Africa's legal transition from apartheid was mostly complete; as was its

economic recovery from the transition. After stagnating again in 1998, South Africa has sustained an average growth rate of 3% per annum.

The historical trend for South Africa's monetary unit, the Rand, has been toward depreciation. The value of the Rand reached a low in 2002Q1 having lost 43% of its value relative to its most recent high, five years earlier (1997Q2). The IMF places the blame for this, partially on the global economic slowdown, and partially on overshooting. This overshooting was corrected, and by 2003Q4, the Rand regained 28.4% of its value.

Unlike many sub-Saharan countries, South Africa has had some success containing its inflation. Down from a daunting 25% inflation rate in 1980, it has maintained its inflation rate at 8% to 10% since 1994. This is still a substantial rate of inflation, and represents one of the many policy challenges for the South African Reserve Bank. In addition, unemployment continues to be a problem in South Africa. According to official statistics the unemployment rate has averaged 28% for the past five years. Expanded definitions of unemployment put the number closer to 40% (STATSSA 2005).

Literature review

Unemployment remains a pervasive problem in South Africa. Hodge (2002) examined whether there is any evidence for a stable Phillips-curve relationship between inflation and unemployment (or employment). He found no evidence of even a short term tradeoff. He did, however, find evidence of such a tradeoff between inflation and growth. The tentative conclusion may be drawn that modest inflation temporarily increases national income. Beaumont Smith et. al. (2003) used firm-level data to examine inflation during the tumultuous period of 1983-1996. They conclude that inflation negatively affects real growth. This would indicate that pump-priming policies might be counterproductive. According to Hodge (2006), the short term effects of inflation on South African

growth are positive only when the inflation is accelerating. Moreover, Hodge finds that the long-run effect of inflation and growth is negative.

Nel and Lekalake (2004) have concluded that South Africa has complied with most of the IMF Codes of Good Practice regarding monetary transparency. This increases the South African Reserve Bank's credibility and is thought to improve the functioning of the financial markets, eliminate market uncertainty, and encourage investment. Akinboade (2004) investigated the relationship between South Africa's budget deficit and its interest rate, using Granger-causality tests, concluding that the two variables were independent.

Jonsson (2001) estimated short and long-term money demand functions for South Africa, concluding that, in the short term, nominal exchange rate shocks become reflected in domestic prices but do not affect real output. Shocks to the money supply do affect output in the short run, but not in the long as these shocks eventually yield inflationary pressure.

It might be argued that properly timed countercyclical macro policy has a stabilizing effect that is conducive to long term growth. Swanepoel and Schoeman (2002) studied the effectiveness of South Africa's tax revenue as an automatic stabilizer. They found no significant evidence that tax revenues acted to stabilize the macro-economy, though they believe it is becoming increasingly important. They leave unanswered the question of why South Africa's tax system does not act as an automatic stabilizer. For the purposes of this paper, however, it is significant that even the simplest of macroeconomic policies, taxation, has proven ineffective.

As a medium-sized open economy, South Africa's trade balance might be susceptible to fluctuations in exchange rates. Gidlow (2001) examined the relationship between the exchange rate and foreign investment, and suggested policies which foster greater monetary stability might insulate South Africa's capital account from exchange rate shocks. He also recommended a reduction in

corporate tax rates. Since savings rates are painfully low in South Africa, the country relies almost exclusively on foreign investment for its capital formation. Schoeman, Robinson et al. (2000) concluded that fiscal constraint (via the deficit/GDP ratio) had a significant and positive impact on foreign direct investment. They also recommended lowering the tax rate on foreign investors.

Might depreciations spur export driven growth? Bahmani-Oskooee and Miteza (2003) argue that changes in the exchange rate have an indeterminate effect on output. Depreciation makes exports cheaper and stimulates aggregate demand; it also increases the costs of imported inputs, diminishing aggregate supply. Researchers are left to study the interrelationship between exchange rates and output on a country-specific basis. Swanepoel and Rangasamy (2004) found that fluctuations in South Africa's real exchange rate are not reflected in net export volumes of manufactured goods. Rather, they find that 71% of an exchange rate change is absorbed by manufacturing firms' profit margins.

The model

The IS-MP-IA model was originally developed by Romer (2000) as an alternative to IS-LM, curing it of some of its methodological deficiencies. IS-LM has been roundly criticized as a coherent model because of its inability to distinguish between nominal and real interest rates. In the textbook version, with the interest rate on the vertical axis, the IS curve relates output to the real interest rate, while the LM curve relates output to the nominal interest rate. Thus, their intersection has no meaning. More correctly interpreted, the IS and LM curves each show an infinity of points where the goods market and the money market are separately in equilibrium. IS-MP-IA corrects this problem, replacing LM's assumption that the central bank follows a money supply rule, with an empirically more reasonable real interest rate rule.

Hsing (2004) extended Romer's model to include small open economies.

Departing slightly from his notation, the model can be stated as follows:

$$Y = C(Y-T, R, S) + I(R, S) + G + NX[e(P/P^f)]$$

$$R = f_R(\pi - \pi^*, Y - Y^*, e, R^W)$$

$$\pi = \pi^e + a(Y - Y^*) + be$$

where Y is real GDP in South Africa. Consumption expenditure (C) depends upon disposable income ($Y-T$), the real interest rate (R) and the price of financial stocks (S). Investment expenditure depends upon the real interest rate and the price of stocks. Government expenditure (G) is taken as given in this model. Net Exports (NX) are a function of the real effective exchange rate, which itself depends, by definition, on the ratio of domestic to foreign prices (P/P^f).

The second equation is the monetary policy reaction function (MP), or Taylor Rule, that forms the MP part of the IS-MP-IA model. According to this monetary policy rule, the interest rate is a function dependent on: the difference between the inflation rate (π) and the inflation target (π^*); the difference between real GDP (Y) and potential output (Y^*), the effective exchange rate (e); and finally, the world interest rate (R^W).

The final equation is the Inflation Adjustment (IA) function. It models the inflation rate (π) as a linear function of the expected inflation rate (π^e), the output gap between real and potential GDP ($Y - Y^*$), and the nominal effective exchange rate (e). The letters (a) and (b) are positive and negative constants, respectively.

Equilibrium output is expected to vary inversely with the expected inflation rate, tax revenues, and the world interest rate. Output should vary positively with government spending and stock prices. On the other hand, according to the Ricardian equivalence hypothesis (Barro, 1989), deficit-financed spending may have no effect in the long run; far-sighted consumers anticipate having to repay their government's debts in the form of higher future taxes; they may contract their consumption spending in order to finance these repayments.

The effect of currency depreciation is not definite. On the one hand, depreciation will increase South Africa's net exports as its products become denominated in cheaper Rand. On the other hand, depreciation may be inflationary, increasing the price of imports, decreasing investment spending in South Africa, and negatively impacting equilibrium output. In fact, whether depreciation is expansionary or contractionary seems to depend upon the researcher, the model used, the time-frame, and the data (a good review is Bahmani-Oskooee and Miteza 2003). Hsing's (2004) extension captured this indeterminacy analytically in his open-economy version of Romer's model.

Hsing (2004) has shown that the endogenous-variable Jacobian is positively valued, and given by:

$$|J| = (1 - C_Y) - aR_\pi(C_R + I_R) - R_Y(C_R + I_R)$$

where subscripts denote partial derivatives. The effect of the exchange rate on output is given by:

$$\frac{\partial Y}{\partial e} = \frac{NX_e(P^f / P) + bR_\pi(C_R + I_R) + R_e(C_R + I_R)}{|J|}$$

Since $NX_e > 0$ while $[bR_\pi(C_R + I_R) + R_e(C_R + I_R)] < 0$, the effect of the exchange rate on real output depends on the magnitude of the effects, and remains an empirical question this paper is meant to address.

The stock market is assumed to vary positively with consumer spending via the wealth effect, and with investment spending via the balance sheet effect. A well-functioning stock market is often a bell-weather for the financial health of the economy. Finally, a higher world interest rate will reduce consumption and investment spending domestically as domestic savings are encouraged abroad, and therefore varies inversely with South Africa's real GDP.

Thus, in summary, the IS-MP-IA model predicts the following relationships. Consumption spending and the stock market index are expected to

vary positively with real GDP. The expected inflation rate and the world interest rate are expected to vary negatively with real GDP. The sign on government spending is expected to be weakly negative. And the sign on the exchange rate is a free variable.

Empirical results

Data over the period 1975q1 to 2003q4 were obtained from the International Monetary Fund's *International Financial Statistics* (IFS) database. Real GDP is in billions of Rand, at 1995 prices. The US Federal Funds rate is used as a proxy for the world interest rate, owing to its importance to the world economy, and the low country-risk. The IMF's share price index captures movements in the South African Stock Exchange (the JSE). Following Davidson and MacKinnon (1985), the expected inflation rate is a weighted average of the previous four years' inflation. The real effective exchange rate is an index number representing the ratio of the rand exchange rate to a weighted geometric average of foreign exchange rates, all adjusted for price differences between the countries. As a geometric average, it is less sensitive to choice of foreign currency. An increase in the exchange rate index represents real appreciation. The deficit to GDP ratio is used to test the effects of fiscal policy. All variables except the deficit to GDP ratio, as it is naturally measured as a percent, are measured in logs.

Phillips-Perron (1988) tests were employed to see whether a variable has a unit root. The null hypothesis is that the variable has a unit root, i.e. that it is not stationary. These test statistics are, roughly, Dickey-Fuller (1979) test statistics that correct for heteroskedasticity and autocorrelation via Newey-West (1987) robust covariance estimates.

The relevant critical values for the Phillips-Perron tests are: -19.8 at the 1% level, -13.7 at 5%, and -1.0 at the 10% level. The test statistics for Real GDP,

expected inflation, the stock market index, and the real effective exchange rate are -0.513, 0.614, -0.886, and -5.793 respectively. Therefore, it is concluded that these variables have unit roots. No unit roots were found for the ratio of world to domestic interest rates (test statistic was -41.206), or to the deficit to GDP ratio (-170.65). All variables were difference stationary at the 1%, 5%, and 10% levels.

**TABLE 1:
 GARCH REGRESSIONS FOR SOUTH AFRICA'S REAL GDP**

	GARCH(1,1)	GARCH(1,0)
Expected inflation rate	-0.548*** (0.010)	-0.545*** (0.011)
Deficit to RGDP ratio	-0.0017** (0.001)	-0.0013** 0.0005
Stock market index	0.008*** (0.002)	0.008*** (0.003)
Real effective exchange rate	-0.002 (0.004)	-0.004 (0.003)
World/S.African interest rate	-0.005*** (0.001)	-0.005*** (0.001)
Constant	11.188*** (0.042)	11.206*** (0.041)
Variance equation:		
arch L1	1.263*** (0.238)	1.386*** (0.312)
garch L1	0.057 (0.065)	
constant	1.04E-06 (1.65E-06)	1.46E-06 (2.48E-06)
*** Significant at the 99% level.		
** Significant at the 95% level.		
* Significant at the 90% level.		
Standard errors are in (parenthesis).		

Since some variables have unit roots, it must be ensured that there exists a stable relationship between the variables before we report regression results. Otherwise, estimated relationships could be spurious, owing to common time

trends rather than to real co-movement. The Johansen method tests for the existence of such an equilibrium relation, called a cointegrating equation. The trace statistic and 5% critical value for one cointegrating relation are 65.7 and 68.5 respectively, suggesting that there is at most one equilibrium relation between these variables.

Estimation employs the GARCH(p,q) methodology (Engle 1982, Bollerslev 1986) to determine the adequacy of the IS-MP-IA model, and draw inference concerning the relative importance of various policy variables for determining South Africa's real GDP. Two sets of results are reported in Table 1. The results are largely indistinguishable between the two model specifications.

Estimates from the variance equation of the GARCH(1,1) model show that the variance in South African real GDP can be reasonably well predicted from an autoregression of 1 lag. That is, a given period of high volatility in South Africa will usually be followed by another. This is shown by the positive and statistically significant coefficient (1.3) on the GARCH term of the variance equation. To put it somewhat paradoxically, volatility is persistent in South Africa.

Expected inflation has a negative and substantial impact on the South African economy, much as it does for other countries in the region. Thus, this paper reinforces the results of Beaumont Smith et. al. (2003) and Hodge (2006), who concluded that inflation negatively effects long-term growth. We find that a one percent increase in expected inflation has a negative effect even on short-term levels, leading to a one-half of one percent decrease in real GDP. Thus, expansionary monetary policy should be restrained.

High budget deficits reflect governments' propensity to substitute future consumption for present consumption. If debt is used to finance investment, this bodes well for the growth prospects of the country's GDP; the opposite holds for debt issued to finance present consumption. A high debt to GDP ratio may send a negative signal that future tax hikes or inflation are more likely. This would imply

that the deficit to GDP ratio is correlated with higher nominal interest rates that are used to hedge against future inflation. Akinboade (2004), however, found no correlation between these two variables in the South African economy. If investors fear inflation or taxation, less capital will be invested locally, thereby diminishing a country's growth prospects. Easterly (2001), for example, reported that countries with budget balances of 0% as a percentage of GDP recorded average growth rates of approximately 2.5%. Countries with budget deficits between 5% and 8% of GDP reported growth rates of approximately 0%.

Schoeman, Robinson et al. (2000) found that fiscal constraint (via the deficit/GDP ratio) had a significant and positive impact on foreign direct investment. This paper extends this result to aggregate income data. Expansionary fiscal policy, via the budget deficit to GDP ratio, has an eventual *negative* effect, though not as large as change in inflation expectations. Every one percent increase in the share of GDP that is spent by the government as reflected in the deficit, leads to a small, but statistically significant, decline in real GDP. The lesson learned, is that expansionary fiscal policy should be restrained as well.

Put simply, local and foreign investors are skittish about putting their money into an economy where government takes an active, and potentially destabilizing, role. The central bank and the government of South Africa should focus less on monetary policy and pump-priming, and more on mitigating the effects of other deleterious factors. One such factor that has received much attention is the AIDS epidemic and human capital formation. This is undoubtedly difficult if both policy arms are tied.

As expected, increases in the world interest rate, relative to South Africa's decrease its GDP, as both foreign and domestic saving is diverted to other countries. This lies outside the policy sphere of South Africa, or any small country for that matter, and simply indicates the disadvantage to being small.

The stock market is shown to be a statistically significant bell-weather for South African GDP. Policy should be focused on encouraging the emergence of this regional market into further prominence. Transparency in accounting rules, and the rule of law itself, is widely known to be essential prerequisites for an efficient and prosperous stock market. This paper shows that there are statistically significant spillovers from the stock market to everyday consumption and real GDP for South Africa. South Africa has complied with most of the IMF's Codes of Good Practice regarding monetary transparency (Nel and Lekalake 2004). Table 1 above shows that this has been a productive enterprise and should be encouraged. Adopting a more standard accounting convention should perhaps also be considered.

Finally, Results from Table 1 reinforce those of Swanepoel and Rangasamy (2004) and Jonsson (2001). Both papers argued that exchange rate changes have little if any effect on income, one finding that the effect is on profit margins, the other finding the similar result that the effect is on domestic prices. This paper has shown that changes in the real effective exchange rates have no statistically significant effect (at any reasonable level) on South African real GDP.

Summary and recommendations for further research

This paper analyzes the interplay of various macroeconomic aggregates in the South African economy, using Romer's and Hsing's IS-MP-IA framework, and the GARCH methodology. Expected inflation is perhaps the largest problem facing South Africa's real GDP, followed closely by the budget deficit and changes in the world interest rate. Of the three, the first two are under the control of South African policy makers. They are encouraged to exercise restraint in both fiscal and monetary policy. Exchange rate devaluations are found to be ineffective. However, changes in stock market valuations indicate that greater transparency could have valuable spillovers into the real GDP data. Put simply,

the goal of policy makers should not be to tinker, but to provide stability, transparency, and the rule of law. Perhaps further research should be directed toward the analysis of rule-of-law measures, and the effects of transparency on the South African economy.

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