DEPARTMENT OF ECONOMICS

Working Paper

**Can macroeconomic policy stimulate private investment in South Africa?
New insights from aggregate and manufacturing sector-level evidence**

by

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Working Paper 2005-14

UNIVERSITY OF MASSACHUSETTS AMHERST

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New insights from aggregate and manufacturing sector-level evidence

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Abstract

This study explores the determinants of investment using both aggregated industry-level data and disaggretated data on 27 sub-sectors of the manufacturing sector for the period 1970-2001. According to the results in this study, the government has potentially powerful means at its disposal to stimulate private investment. In particular, a domestic demand stimulus and public investment expansion will produce large gains in private investment. While the direct effects of lowering the interest rate appear to be quantitatively small, indirect effects operating notably through domestic demand and cheaper credit are likely to be large. The evidence in this study also indicates that it is important to minimize exchange rate instability to encourage investment.

This draft: September 2005

I. Introduction

The South African economy has achieved substantial success in the area of macroeconomic stabilization in the post post-apartheid era.[1] However, stabilization has not yielded the growth rates that are needed to lift up the living standards of the majority of the population. Most importantly, despite remarkable success in the areas of macroeconomic stabilization, the country still faces difficult challenges arising from the legacy of marginalization of the majority of the population from the main stream economy.[2] Increasing the living standards of the majority of the population will require faster overall growth, vigorous employment creation, and stronger and sustained private investment response to policy reform.

Since the second half of the 1970s, performance in private and public investment has been disappointing. From 1993 to 2002, total investment as a ratio of GDP increased only by 1.3% on average in real terms. This study explores the determinants of investment with the explicit goal of guiding a discussion of how macroeconomic policies can be used to induce an "investment transition" in South Africa.[3] There are important empirical and policy reasons for why investment should be at the center of the debate on how to promote growth and raise employment. The empirical literature has identified

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[1] A recent IMF Staff Report (IMF 2003) commended the South African authorities for maintaining "strict fiscal discipline", managing the currency, and controlling inflation. For a quantitative analysis of macroeconomic stabilization in South Africa, see Du Plessis (2002, 2004); Du Plessis and Smit (2003).
[2] See Gelb (2004) for a review of recent macroeconomic developments.
[3] By "investment transition", we understand sustained substantial increase in the investment/GDP ratio over several consecutive years. In a cross-country analysis, Rodrik (1999) finds that countries that experience an investment transition go from a GDP growth rate of 0.8% above world average to 1.4% above world average (amounting to 2.2% gain in growth). Sub-Saharan African countries in general have had difficulty sustaining investment growth.

investment as the most robust determinant of economic growth (Levine and Renelt 1992), especially equipment investment (De Long and Summers 1991). Both private investment and public investment are key determinant of cross-country differences in long-run economic growth (Easterly and Rebelo 1993). This empirical relationship between investment and growth has led observers to identify low investment as one of the leading causes of the slow growth in developing countries in general and in African countries in particular (Collier and Gunning 1999; Greene and Villanueva 1991).

In addition to its documented contribution to growth, private investment in the case of South Africa deserves serious attention for three additional reasons. First, sustained increase in private investment will serve as visible proof of the private sector's confidence in public policy both in the sense that policy is heading in the right direction and that policy reforms are deemed sustainable in the long run. Achieving the growth rates needed to alleviate poverty and raise employment will require active participation of private investors. Second, sustained increase in private investment is a sign of efficiency of public investment especially in reducing the costs of private investment, thus raising profitability.[4] Third, sustained improvement in private investment serves as a catalyst for attracting foreign direct investment as it is an indicator of high returns to investment and declining investment risk in the country.

The study explores the determinants of private investment with a special emphasis on the role of factors that are related to macroeconomic policy. An econometric analysis is

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[4] See Rienikka and Svensson (2002) for firm-level evidence on the important role of public services for private investment. The authors find that while firms may attempt to find alternative private sources of normally publicly supplied services, they do so at the cost of reduced capital accumulation.

undertaken to attempt to quantify the effects of individual macroeconomic policy indicators on investment to identify channels of transmission of macroeconomic policy. The analysis provides quantitative evidence that may shed light on strategies for boosting private investment as the country seeks ways to raise the trend of GDP growth and accelerate employment creation.

II. Trends and patterns of aggregate and sector-level investment

Investment in South Africa has exhibited two features: a long-run decline since the mid-1970s and high short–run volatility (Figure 1). The country has been unable to sustain increases in investment, as expansions of investment are followed by contractions. Up to the mid-1970s, the country maintained a steady upward trend in domestic investment, peaking at 29.7 percent in 1976. Since then, investment has exhibited a steady decline. From an average of 26.4 percent of GDP in the 1970s, the investment/GDP ratio declined to 23 percent in the 1980s and has averaged only 15.6 percent of GDP during the past 10 years of the post-apartheid era.

The rate of capital accumulation has declined in all sectors since the 1970s, although the decline has been more dramatic in some sectors than in others. In the service sector, the rate of capital accumulation has declined from about 10 percent in 1970 to less than 1 percent in 2002. While investment in the manufacturing sector showed some improvement since the mid-1990s, the recovery was unbalanced. It was mainly driven by a few subsectors, iron and steel, non-ferrous metal, and basic chemicals (Roberts 2004).

Agriculture has experienced consecutive years of decline in capital accumulation since the early 1980s and shows no signs of recovery.

The data indicate that while private investment has exhibited a slow but steady recovery since the mid-1980s, public investment has declined systematically from since 1976 from 11.5 percent of GDP to a low of 4 percent in 1994 and stood at 5 percent in 2004 (Figure 2). Public investment in South Africa was above the Sub-Saharan average until 1986 but since then it has declined and dropped below the average for SSA and middle-income countries (Figure 3).[5] Increasing the country's public investment from its current level of 5 percent of GDP level to at least the modest African average of 7 percent would result in substantial gains in infrastructure.

The trend of public investment in South Africa casts doubts on some claims in the empirical literature about the level of public investment and its effects on private investment. First, the claim that public investment may be "too high" in Africa (Easterly and Pack 2001) certainly does not apply to South Africa. The decline in GDP growth experienced since the 1980s cannot be blamed on high public investment since the latter declined as growth was deteriorating. In contrast, one may argue that the decline in public investment is partly responsible for poor growth performance. Second, the claim that allocation of national resources was biased in favor of public investment relative to private investment is not supported by the data. Mlambo and Nell (2000: 96) argue that low real interest rates in the 1970s and 1980s redirected capital to the less productive

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[5] According to the 2004 World Bank classification, South Africa is at the cut off point between upper middle and lower middle income countries. Comparisons between South Africa's public investment with either of the two groups shows a similar pattern.

parastatals away from more productive private sector. This argument is problematic. First, lower user cost of capital would redirect capital to the public sector only if there are quantitative restrictions to access to credit for the private sector that create a "captive market" for government debt. Second a decline in the cost of capital would reduce private investment if the returns to capital are declining faster than the costs of capital. There is no evidence for such a phenomenon either in South Africa or in other African countries in general, where profit rates are generally high (Gunning and Mengistae 2001; Bigsten et al 1999). Third, public investment started to decline in the mid-1970s when real interests were negative and continued to decline even when real interest rates turned positive and started to increase in the late 1980s. High real interest rates did not redirect capital into private investment. In contrast, the evidence seems to support the empirical finding that the long-run level of public investment is an important factor for private investment. Blejer and Khan (1984) find that while public investment may crowd out private in the short run, the trend level of public investment has a positive effect on investment. This suggests that the positive externalities associated with investment in infrastructure outweigh any short-run costs associated with the potential adverse effects of public expenditure on the cost of capital. Claims of "crowding out" based on short-run relationships may therefore be misleading.

III. Major macroeconomic policy regime shifts and their relevance for investment

Monetary Policy

Monetary policy orientation in South Africa has experienced a series of changes since the 1960s (for details, see Table A1).[6] In the 1960s and for most of the 1970s, the Reserve Bank used the ratio of liquid assets to deposits as its main tool for controlling financial intermediation by reducing bank lending in order to control money supply and inflation. Performance of monetary policy was poor during this period and inflation remained high and volatile. In the mid-1980s, following the recommendations by the De Kock Commission (1985), the Reserve Bank shifted its policy framework to a cost-of-reserves based system, taking effect in mid-1985.

From 1986 to 1998, the Reserve Bank used monetary aggregates as intermediate targets with pre-announced growth rates. By the end of the 1990s, it was evident that targeting monetary aggregates was an ineffective guide for monetary policy. From 1986 to 2000, the Reserve Bank overshot its pre-announced growth rate of the broad money stock in 9 years out of 15.

In March 1998, the Reserve Bank announced a new system of monetary management, consisting of daily tenders of liquidity through repurchase transactions, with the explicit intention of rationing the amount of liquidity in the system. This was the beginning of a movement towards a "market-oriented" monetary policy system where interest rates are determined by market forces. The Reserve Bank expressed its desire to reduce inflation to the levels prevailing among the country's major trading partners and announced an

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[6] A non-exhaustive list of useful references on the history and conduct of monetary policy in South Africa includes. Du Plessis (2002); Du Plessis and Smit (2003); Whittaker (1992); Padayachee (2001); De Wet, Jonkergouw, and Koekemoer (1995).

informal inflation targeting framework with a range of 1-5% for the overall CPI index. In February 2000, the government formally adopted inflation targeting as the principal objective and focus of monetary polity.[7] The rationale of the shift was that inflation targeting is the best way to achieve price stability because it specifies a precise target inflation rate and indicates a clear commitment by the monetary policy authority to achieve the target. According to the SARB, inflation targeting "helps to anchor the public's inflation expectations, thereby improving planning for the economy, as well as providing an anchor for expectations of future inflation to influence price and wage setting."[8]

The Reserve Bank has pursued inflation targeting by keeping interest rates high as a way of controlling domestic demand. The nominal interest rate has at times risen while inflation was declining (as in 1993-98), resulting in a sharp increase in real interest rate. Real interest rates also have increased faster in South Africa than in trading partners, resulting in higher interest rates differentials (Figure 4). These developments imply that firms are facing higher costs of credit, which constitutes a constraint to capital accumulation.

Monetary policy influences private investment directly by affecting the cost of credit. Therefore, there is an inherent tension between the objectives of achieving low inflation

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[7] In 2000, the Finance Minister signed a letter to the Reserve Bank Governor constituting an agreement between the Government and the Reserve Bank on inflation targeting. The letter outlined how the Reserve Bank ought to handle unforeseen shocks (oil prices, drought, changes in direct taxes, international financial contagion) that may prevent the Bank from achieving the target, in which case the Reserve Bank will give a full public explanation.
[8] Tito T. Mboweni (Governor of the South African Reserve Bank). "The objectives and importance of inflation targeting." *Business Day*, November 13, 2002.

and the goal of promoting domestic investment. Monetary policy affects investment indirectly as well by constraining domestic credit as a means of controlling inflation. In 2000, South African Finance Minister Trevor Manuel stated that high domestic credit extension is an obstacle to economic development and a constraint to monetary policy. He put is as follows: "Living beyond our means has become part of the national psyche. It is saddening. We would like to bring down interest rates, but as long as private credit extension is so high, that counteracts development."[9] The problem with this orientation of monetary policy is that by constraining credit expansion, contractionary monetary policy reduces aggregate demand, which constitutes a constraint to investment and output expansion. Tight monetary policy associated with high interest rates and a strong currency also hurt the export sector, undermining international competitiveness. Achieving low inflation is therefore potentially costly in terms of reduced investment, employment, and output.

Exchange rate policy

The South African exchange rate regime has undergone five major phases since the 1960s (De Kock Commission 1985; Aron, Elbadawi, and Kahn 2000). The first phase goes until 1978, where the rand was pegged alternatively to the dollar and the pound. This period was also characterized by strict controls of the capital account. In 1979, following the recommendations by the De Kock Commission, the government adopted a dual exchange rate system to stabilize the capital account while attracting foreign

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[9] *Saturday Star Business Report*, 12 August 2000. Cited in *South Africa Survey 2000/2001* (by the South African Institute for Race Relations, Johannesburg), p. 442.

investment. Under this system, current account and loan transactions were executed at a market-determined exchange rate, the *commercial rand*. Equity capital, in turn, was transacted at a freely floating exchange rate, the *financial rand*. The reform was intended to eliminate the disincentives associated with the pre-existing *securities rand* system, whereby inflows of investment other than purchases of listed securities were transacted at the official exchange rate whereas investment outflows were transacted at a lower rate. In 1983, the dual system was unified under a controlled float system (third phase), but the dual system was reintroduced in September 1985 and lasted until 1995 (fourth phase). In March 1995 (fifth phase), the regime was unified again, in the context of a systematic move toward a market-based exchange rate system.

The past shifts in exchange rate regimes proved inefficient in stabilizing the capital account and the value of the rand. Under the fixed exchange rate where the Reserve Bank was effectively controlling the sale and purchase price of currency, the regime prevented the emergence of an active and competitive foreign exchange market. At the same time, exchange controls proved inefficient in protecting the official exchange rate and in deterring capital outflows.

Movements in the exchange rate of the rand have historically been driven by the policy stance in the area of exchange rate and capital controls and by political developments and external shocks (especially commodity price shocks). The most noteworthy political events that had substantial effects on the exchange rate are the 1960 Sharpeville massacres, the 1976 Soweto riots, and the protracted political unrest beginning in the

mid-1984. These political shocks were followed by large capital account deficits, largely due to capital outflows but also due to reduction in capital inflows including debt, which resulted in depreciation of the exchange.

The effects of the exchange rate on private investment are theoretically ambiguous. Real exchange rate depreciation increases profitability in export oriented sectors and therefore promotes investment in these sectors. Conversely, depreciation of the exchange rate increases the cost of imported capital goods, and thus decreases investment in import dependent production sectors. The study by Mlambo and Nell (2000) finds that the appreciation of the rand had a negative effect on investment. Most importantly, the volatility and unpredictability of the exchange rate increase uncertainty, which discourages long-term investment in capital stock in favor of short-run speculative activities. The empirical analysis in this study will explore the effects of exchange rate instability on investment.

Fiscal policy

The post-independence South African government has gained international reputation for "strict fiscal discipline," a label that is rarely attached to a developing country (IMF 2003). The fiscal situation in recent years constitutes a marked departure from past history of high deficits and politically motivated government spending. Until the mid-1990s, the South African government systematically ran high deficits, mainly due to high (politically motivated) expenditure and weak revenue performance. The fiscal deficit

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exploded especially in the last years of the apartheid regime as the National Party prepared to exit and engineered a massive increase in public salaries as well as pension payouts (Gelb 2004: 4). At the end of the apartheid regime, government expenditures also increased as a result of "social upliftment" initiatives (Cronje 1998).

The budget deficit rose from 3 percent of GDP in 1988 to a record high of 8 percent in 1994 (Figure 5). Government debt increased from 33 percent to 50 percent of GDP during the same period. Since 1994, the deficit has declined steadily due to both better revenue performance (from efficiency gains in tax collection as well as an increase in the tax base) and compression in expenditures.

The main shift in fiscal stance occurred in 1999 as the government sought to achieve fiscal stability through the reduction of the deficit. The target for the conventional fiscal deficit was set at 3 percent of GDP.[10] The following year the government announced the adoption of inflation targeting as the overriding goal of monetary policy.

Fiscal policy may affect private investment through five channels. First, under the view that investment is dependent on saving, fiscal policy influences private investment by affecting the volume of savings. Tight fiscal policy is supposed to promote private investment by raising total domestic saving and reducing interest rates. Second, from an intertemporal view of investment behavior, fiscal policy can also promote investment by building investors confidence vis-à-vis predictability and credibility of fiscal policy. For

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[10] Fiscal deficit targeting was initially adopted at the end of 1994. It is coincidentally in 1994 that reserve bank independence was included in the interim Constitution.

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this channel to operate the government must not only pursue low fiscal deficits, but also be consistent in pursuing clear and pre-committed goals; that is, the government must overcome the problem of time inconsistency of fiscal policy. Third, under the view that investment is demand constrained, fiscal policy influences investment by affecting domestic demand. Tight fiscal policy through expenditure compression or/and tax hikes reduces domestic aggregate demand, which negatively affects sales and profits expectations, thus reducing incentives to invest. Fourth, fiscal policy affects investment directly through the cost of capital as influenced by tax policy. Finally, fiscal policy affects investment through public infrastructure investment, which reduces private costs of production thereby raising profitability.

In light of the above five potential channels of the effects of fiscal policy on investment, it appears that the recent orientation of fiscal policy in South Africa has pursued the first two channels (deficit-saving-investment linkages and intertemporal considerations). The government expected that reducing the deficit and establishing a record of credibility and consistency in fiscal policy would boost private investment. This has not happened as investment has continued to be sluggish. This may suggest at least two interpretations. First, saving may indeed not be the constraint for private investment (Gelb 2004: 14). Second, the dividends from fiscal policy credibility and consistency may be slow to materialize. This would be because the private sector is still unsure about the sustainability of macroeconomic policy stance in the long run. This may be also due to *perception gaps* between what the public believes and what the government actually accomplishes (Gelb 2002: 32).

Policy makers have overlooked the third and fourth channel of the linkages between fiscal policy and investment (through aggregate demand and public infrastructure investment). In fact, the monetary authority has explicitly pursued policies that contain domestic demand as a way of controlling inflation as we discussed in the section on monetary policy earlier. By containing domestic demand, the authority may have indirectly contributed to the slow growth of domestic investment. The effects of low domestic demand on private investment may have exacerbated the effects of the decline in public investment observed since the 1970s.

IV. New estimates of the impact of macroeconomic policy on investment

Motivation of the empirical model and estimation methodology

The empirical analysis in this study aims at exploring the effects of macroeconomic policy on private investment for the purpose of examining strategies that may be used to boost private investment. We adopt a hybrid model that draws from the neoclassical and Keynesian traditions by emphasizing the role of demand (the accelerator), the cost of capita, and profitability.

The demand-investment link and macroeconomic policy

The accelerator theory of investment suggests that investment responds to changes in demand for output (Jorgenson 1971). Macroeconomic policy can affect private investment by affecting domestic demand directly. A contractionary monetary policy

that raises interest rates and/or constrains credit expansion will reduce aggregate demand, which reduces private investment. Demand is also affected by fiscal policy directly through government spending and indirectly through transfer programs.

This study explores demand effects by including real GDP growth in the investment equation. Existing empirical studies on South Africa confirm the important role of demand for investment (Table 1). Data on the manufacturing sector also provide indirect evidence on the role of demand. Insufficient demand account for the bulk of the underutilization capacity in the sector (Table A3).

One condition for validity of the accelerator is that installed capacity is fully utilized. When firms have idle capacity, they can meet an increase in demand by raising production without installing new capital. We control for these effects by including capacity underutilization in addition to output growth. However, data on capacity utilization by sub-sector are only available starting from 1986. The regressions with capacity underutilization also serve to check the robustness of the results obtained with the longer sample period.

Cost of capital

Firms invest up to the point where marginal efficiency of capital equals the user cost of capital. A rise in the user cost reduces optimal capital stock and investment. The basic measure of capital stock comprises the real interest rate, the effective corporate tax rate,

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the depreciation rate and the ratio of the price of capital goods to the price of output.[11]

The measure used in this study is the following:

$$uck_{it} = (PPI_{it} / p_t).(R_t - \pi_t + \delta_{it})/(1 - \tau_t)$$
<div align="right">eq.1</div>

where *PPI* is the sector or industry-specific producer price index, p is the GDP deflator, *R* is the nominal interest rate, π is the inflation rate, δ is sector or industry-specific depreciation rate, and τ is the corporate tax rate.[12]

The user cost of capital is then decomposed into its policy components in order to quantify the effects of macroeconomic policy on investment through the cost of capital. Monetary policy affects the cost of capital through the interest rate and inflation. The data show that since the mid-1990s, nominal interest rates remained high even when inflation started to decline, which resulted in high interest rates. Moreover, misalignments of domestic interest rates relative to international rates resulted in high interest rate differentials, which tends to reduce incentives for investment in capital stock while encouraging speculative investment. The study explores these effects by regressing investment on alternatively the nominal interest rate, the real interest rate and the interest rate differential. The effects of fiscal policy are tested through the corporate tax rate.

Public investment and government debt

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[11] A comprehensive measure of the user cost of capital takes into account returns to equity, investment tax credits, tax liability implications of dividend payouts, tax implications of debt financing, etc. See Jorgenson and Hall (1967) for details.
[12] We do not have data on value added by sub-sector in the manufacturing sector. Therefore, this variable is not included in the manufacturing sector regressions.

Public investment affects private investment through two main channels. The first channel works though positive externalities of public services and infrastructure that reduce production and transactions costs, thus raising marginal efficiency of private capital stock. The second channel operates through demand. An increase in public investment causes domestic demand and incomes to rise directly and through the multiplier effects.

Empirical studies on South Africa have shown crowding-in effects of public investment on private investment. Mlambo and Nell (2000) find that a 10 percent increase in government expenditure results in a 0.24 percent increase in private investment. Fielding (1999) estimates the elasticity of private investment with respect to public investment to be 0.44 for traded capital and 0.36 for non-traded capital.

The ability to use public investment to stimulate private investment is constrained by the ability of the government to finance public investment without creating excessive pressure on the budget. The crowding-in effects of public investment on private investment may be mitigated by crowding-out effects of deficit financing. We explore empirically the net impact of these crowding-out and crowding-in effects to assess the feasibility of a public-investment driven stimulus for private investment.

Labor market factors: costs and skills

Whether high labor costs cause firms to substitute labor for capital ultimately depends on the nature of the technology used in the industry. If capital and labor are substitutes, then we expect a negative correlation between labor costs and investment. There is little empirical evidence on South African private sector in support for either a positive or negative effect of labor costs on investment. While Mlambo and Nell (200) find a negative effect of labor costs on investment the effect is quantitatively very small (an elasticity of -0.009). Fielding (1997) in contrast finds a positive correlation between labor costs and investment suggesting substitution between capital and labor.

Labor costs will encourage capital-labor substitution if labor costs are rising faster than labor productivity. We test for this possibility by including in the empirical model a measure of the wage-labor productivity gap defined as the difference between the growth rate of real wages and the growth rate of labor productivity. The results were insignificant and are not reported in the paper.

One potential constraint to investment is the shortage of skilled labor. In the context of a technologically advancing economy, investment expansion requires adequate skills in the labor market. In South Africa, given the historical legacy of marginalization of the black population in education, a large fraction of the labor force comprises low-skilled workers. Unfortunately, it was not possible to test for these effects because do not have reliable data on skill composition of the labor force by sector.

Data and highlights

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The empirical analysis is based on a panel of aggregate data on the 9 major industries as well as a panel data on 27 sub-sectors of the manufacturing sector over the period 1970-2001. The industry-level analysis allows us to make inferences on economy-wide effects of policy on investment. The analysis at the disaggregated level in turn provides more degrees of freedom and variability in the regressors, which should improve the quality of the estimates. Using both levels of aggregation allows us to generalize the results that are consistent in both sets of data. Analyses using only aggregate data are often criticized for being too far from the level where the actual investment decision takes place. Analyses at the micro-level in turn face the challenge of generalizability of the results. We are able to circumvent the shortcomings of the analysis at either level while taking advantage of the benefits arising from each level of aggregation. We can be confident that results which are robust at both levels of aggregation are indeed telling us something about the true response of private investment to policy innovations.

Although most of the relevant series are available up to 2003, we stop the regression sample at 2001 because of discontinuities in the unit labor costs series after 2001 that make the data incomparable before and after 2001. Another truncation of the sample occurs when we include a measure of capacity utilization for which the information is available only starting from 1986. Therefore regressions with capacity utilization cover the 1986-2001 period.

Specification and estimation methodology

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Taking into account the foregoing discussion and the objectives of the study, we formulate a dynamic empirical investment model that emphasizes the role of demand and the cost of capital, the latter being a function of policy, controlling for other determinants of investment. The model is specified as follows:

$$I_{it} = \alpha_0 + \sum_{j=1}^{q} \alpha_j I_{i,t-j} + \sum_{j=0}^{q} \beta_j Y_{i,t-j} + \sum_{j=0}^{q} \beta_j uck_{i,t-j} + \sum_{j=0}^{q} \beta_j X_{i,t-j} + \nu_i + \varepsilon_{it} \qquad \text{eq.2}$$

where I is the investment-capital stock ratio; Y is the industry or sector output; uck is the user cost of capital, which is a function of policy variables, namely the interest rate and the effective corporate tax rate; ν_i represents industry- or sector-level fixed effects; ε is a random error term; q is the number of lags for the regressors (which may vary by regressor); and X is a vector of other determinants of investment. Among other determinants of investment we explore fiscal policy variables (public investment and domestic government debt), labor market factors (the unit labor costs), indicators of macroeconomic instability, namely inflation and exchange rate variability,[13] capacity underutilization, and profits. Real profits are obtained by deducting the real wage bill from real value added: $profit_{it} = va_{it}/p_t - w_{it} * L_{it}$, where va is real value added, w is

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[13] A proxy for the variability of the real exchange rate is calculated as the absolute value of the deviation of the annual value of the real exchange rate from the average of the previous three years. A drawback of this proxy is that it assumes symmetry of the effects of exchange rate instability on investment (appreciation vs. depreciation). Regressions with the actual deviation yield an insignificant coefficient.

real earnings per employee, L is employment. The summary statistics for the regression variables are given in Tables A2-A3 in the appendix.[14]

To handle country fixed effects, we can first-difference or mean-difference equation eq.1. First-differencing yields the following:

$$\Delta I_{it} = \alpha_0 + \sum_{j=1}^{q} \alpha_j \Delta I_{i,t-j} + \sum_{j=0}^{q} \beta_j \Delta Y_{i,t-j} + \sum_{j=0}^{q} \beta_j \Delta uck_{i,t-j} + \sum_{j=0}^{q} \beta_j \Delta X_{i,t-j} + \Delta \varepsilon_{it} \qquad \text{eq.3}$$

However, by construction, the first-differenced error term in eq.3 is no longer orthogonal to the first-differenced regressors, especially the differenced lagged dependent variable, thus violating an important condition for validity of the OLS estimators. We can apply the standard instrumental variable approach to address this issue or apply a more general method where all (first-differenced) regressors are potentially endogenous. The general method is implemented with the GMM procedure where second and higher lags of the levels of the endogenous variables and the lagged dependent variable are used as instruments of the differenced endogenous variables and the differenced lag of the dependent variable, while differenced exogenous variables serve as their own instruments (Arrelano and Bond 1991). For the industry-level data, the instrumental-variable fixed-effects regressions produced superior results to GMM regressions. For the manufacturing sector data, the two-step GMM procedure was applied as the one-step results indicated the presence of a first-order serial correlation.

Discussion of the empirical results

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[14] The means are used to compute the elasticities associated with the regression coefficients. In the regressions on the manufacturing subsector with a measure of capacity underutilization, the variables are in logs (thus the coefficients are elasticities) except for the growth rate of output and the real interest rate, for which the elasticities are obtained by multiplying the coefficient and the mean of the regressor.

The regression results are organized as follows: regressions on industry data are reported in Table 2. Regressions on manufacturing sub-sectors are in Table 3 and the implied elasticities are reported in Table 4 (both at the industry level and for the manufacturing sector). The regressions on the 1986-2001 period that include capacity underutilization are reported in Tables 5. The discussion will emphasize results related to factors that can be influenced by policy.

Demand and the accelerator effects

The regression results confirm a significant and robust accelerator effect on investment at the aggregate/industry level as well as at the manufacturing sector level. If we interpret industry-level results as economy-wide results, these results suggest that were the country able to raise its trend GDP growth from its current level of 3 percent to 4.5 percent, this would induce a one percent increase in investment. Regressions that include real output rather than its growth rate show a very high demand elasticity of investment, where every one-rand additional domestic demand induces about 80 cents of new investment (not reported here but available from the author upon request).

These results suggest that an important strategy for increasing investment is to raise the level of domestic demand and the trend growth of GDP. The relationship between demand/growth and investment goes both ways. Raising demand and growth stimulates investment, but also more investment itself will contribute to more growth. A domestic demand stimulus is a precondition for investment response to policy reform. Therefore,

policies that raise income to stimulate private consumption, such as direct government spending on infrastructure and social transfers will have positive effects on private investment through the accelerator effects. In the end, expansionary policies will have beneficial effects on growth through capital accumulation.

The cost of capital: interest rate and corporate tax

Consistent with earlier studies, we find that investment is responsive to the cost of capital (also see Hirsh 2004). However, the effect of the composite measure of the user cost of capital is insignificant at the industry level (not reported here) and, while it is significant at the manufacturing sector level, it is quantitatively small (with an elasticity of -0.085). We decompose the user cost of capital to isolate the effects of the real interest rate and the corporate tax rate.

We find that both the real interest rate and the nominal interest rate have a negative and significant effect on investment both at the economy-wide level and in the manufacturing sector. However, investment seems to be more responsive to changes in the nominal interest rate than changes in the real interest rate. The real interest-rate elasticity of investment is -0.07 at the industry level compared to -0.26 for the nominal interest rate. The corresponding elasticities in the manufacturing sector regressions are -0.05 and -0.18, respectively. Note, however, that when we control for capacity underutilization, which is a richer specification of the accelerator investment model, we obtain a larger effect of the interest rate. The increase in the coefficient and elasticity is more noticeable for the real interest rate, tripling from -0.05 to -0.16 while that associated elasticity with

respect to the nominal interest rate rises from -0.18 to -0.31 (Tables 5). According to the results in Table 5, if the real interest rate was reduced from, say 10 percent to 8 percent (a 20 percent cut), investment would increase by about 3 percent.

Although the direct positive effects of lowering the interest rates on investment may seem quantitatively small, there is one important advantage to exploiting this effect to stimulate investment. The government has at its disposal ready policy tools for cutting the interest rate to encourage investment without having to wait for other changes in the economy to occur first. These policy tools are monetary policy to lower the general level of market interest rates and credit allocation policies to provide favorable rates for sectors of the economy that are deemed to have strong income and employment multiplier effects.

The results show that a high effective corporate tax rate can deter private investment. The regressions on the full sample suggest that these effects are likely to be quantitatively small. Note, however, that the regressions with capacity underutilization on the shorter sample period yield larger effects, implying that a 10 percent increase in the corporate tax rate may cause as much as 2 percent contraction in investment (Tables 5). This suggests that the government faces limitations in its ability to raise revenue by increasing taxes on businesses. This also implies that there is a need for exploring alternative sources of tax revenue (other than increasing taxes) that do not have direct adverse effects on the profitability of capital accumulation.

Public investment and profitability

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Consistent with other studies, this paper finds that higher profitability stimulates private investment. To the extent that policy can increase firm profits, this would increase investment. One way for policy to promote firm profitability is through public infrastructure investment. Investments in improvement of availability and quality of transportation services, telecommunication, electricity, etc., will reduce the costs of production, raise profitability, and stimulate private investment.

According to the regression results, increasing South Africa's ratio of public investment to GDP from its current level of 5 percent to, say 6 percent – the average level for upper-middle income countries, would generate 5.6 percent more investment.[15]

The results are consistent with firm-level empirical evidence on the role of infrastructure and public services for investment. For example, using firm data on Uganda, Reinikka and Svensson (2002) find that the lack and inefficiency of public services constitute an important deterrent to investment. They find that while firms find alternative private means of supplying for these services (e.g., private generators of electricity), this is accomplished at the cost of lower capital accumulation.

Given that public investment appears to be a strong booster for private investment, the natural question then is how to finance public investment expansion and how the financing in turn will affect investment. Government could raise revenue or resort to debt financing, which, according to South African government practice would involve

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[15] South Africa is right at the cut off point between upper middle income and lower middle-income countries. Raising South Africa's public investment to the average for lower middle income countries (7%) would result in a 11 percent increase in private investment.

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primarily domestic borrowing. According to the results in this study, domestic borrowing

by government has a negative impact on investment. However the results also suggest

that the net impact of an increase in public investment financed by domestic borrowing is

likely to be positive. For example, if the increase in the public investment-GDP ratio

from 5 percent to 6 percent described above was entirely financed by domestic debt, the

crowding-out effect of the associated domestic borrowing would be a 1.7 percent decline

in private investment and the net impact would be a 3.9 percent increase in private

investment.[16]

The actual net gain from expanding public investment may be lower than these estimates

suggest due to other indirect effects of government borrowing, including higher interest

rate. We control for these effects in the regressions by adding the interest rate

simultaneously with public investment. High levels of debt may also have negative

overhang effects on private investment. Despite all these possible mitigating effects, the

empirical evidence in this study supports the view that raising public investment

constitutes a potent tool for boosting private investment. The results cast doubt on claims

that public investment may have crowded out private investment. Instead, the results

suggest that the government can stimulate an investment transition by raising its

expenditure on infrastructure. The results further suggest that the prolonged decline in

public investment since the mid-1970s may have contributed to sluggish private

investment.

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[16] Using the results in Table 5 where public investment and domestic borrowing are entered
simultaneously, the net impact of a debt-financed increase in public investment is a 7.5 percent gain in
private investment. This is not surprising since the extra domestic debt needed to finance the increase in
public investment is an increase from a bigger base than the increase in public investment.

Macroeconomic uncertainty: inflation and exchange rate variability

The literature on investment in South Africa has emphasized macroeconomic and political uncertainty as an important deterrent to private investment (Fedderke 2004; Fielding 1997; Heintz 2000, 2002; Hirsh 2004). The results in this study show that macroeconomic instability as measured by inflation and exchange rate variability has negative effects on private investment.

The immediate policy implication of this result is that macroeconomic policy that aims at maintaining a stable value of the national currency while keeping inflation within reasonable range will help to promote private investment. The key is to establish and maintain credibility through prudent macroeconomic policy. In particular, monetary and exchange rate policy must be predictable by avoiding sudden changes in policy rules. However, the objective is not to achieve the lowest level of inflation. Such a strategy would require maintaining high interest rates and large interest rate differentials, which as demonstrated in the regression results, would hurt private investment. Moreover, targeting a very low inflation rate would result in an overvalued currency, which would discourage investment in export-oriented sectors and sectors that depend on imported inputs.

The empirical results suggests that the benefits from the current relatively tight macroeconomic policy regime in terms of low inflation and policy credibility may be offset by negative effects of high interest rates on private investment. The implication is

that while the government needs to continue pursuing prudent macroeconomic policy, there is a need to reevaluate the tightness of policy targets. It is important to explore whether there is room for reducing the interest rate without running the risk of causing the inflation to rise out of control. To the extent that the inflation target and outcomes remain in the single-digit range, and that macroeconomic policy continues to follow clear and consistent rules, there is good reason to believe that a cut in the interest rate would stimulate investment without undermining the success achieved during the post-apartheid era in the areas of stabilization and credibility of macroeconomic policy.

Labor market factors

The industry-level results show no significant effect of the unit cost of labor on investment. However, the results for the manufacturing sector show a negative effect (though not robust to alternative specifications) of unit labor costs on investment, implying some complementarity between labor and capital. However, as discussed above, a rise in wages discourages employment in the absence of offsetting labor productivity growth. According to the data on the manufacturing sector in Table A3, the wage-labor productivity gap seems to be positively rather than negatively correlated with employment growth. It appears that manufacturing subsectors where wages lagged behind labor productivity are also those which shed employment and vice versa.

Overall, the results in this study are largely inconclusive vis-à-vis the linkages between labor market conditions and investment. The results certainly do not support the view that labor costs are an important factor for labor shedding as a result of capital-labor

substitution. However, the analysis is limited due to data scarcity which did not allow to incorporate the constraint of skills shortage. This is a serious concern in the context of an economy that is experiencing simultaneously rapid technological advancement and high unskilled unemployment. This topic merits serious attention.

V. Conclusion

This study aimed at documenting the role of determinants of private investment that are directly related to macroeconomic policy using both aggregate data at the industry level and disaggregated data at the sub-sector level in the manufacturing sector. We highlight here four main conclusions from the econometric results which are especially relevant for policy. First, a demand stimulus will have substantial effects on private investment. This result implies that low domestic demand will continue to be a constraint to investment expansion. Government policy can exploit this channel to stimulate investment through strategies that raise public as well as private domestic spending. Second, the results suggest that relaxing the monetary policy stance will have some positive effects on private investment. While the direct effects of interest rate cuts may be quantitatively small, it is still useful to exploit this policy route given that the government has direct measures to reduce the interest rate. Moreover, indirect effects of lower interest rates operating notably through higher domestic demand and cheaper credit will amplify the direct effects in stimulating investment.

Third, the study finds that higher profitability stimulates investment. One means at the government's disposal for exploiting this result for stimulating investment is through public investment. Higher investment in public infrastructure such as transport, telecommunication, and electricity will reduce private costs of production, thus raising profitability, which will stimulate private investment. The results in this study establish a strong crowding-in effect of public investment on private investment. Simple simulations from the regression results indicate that the crowding-in effects of public investment tend to dominate the crowding-out effects of domestic borrowing by the government. Note that the government needs to explore other means for financing public investment that do not involve increasing domestic borrowing. A public-investment led stimulus for private investment is a fiscally feasible strategy.

Fourth, the results indicate that macroeconomic stability is essential for private investment. In particular, price stability and exchange rate stability are important conditions for private investment expansion. The results suggest that the gains from prudential macroeconomic policy are substantial. Therefore, the need to stimulate private investment through relaxation of the macroeconomic stance ought to be balanced with the need to preserve macroeconomic stability.

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Table 1: Determinants of private investment – Selected empirical evidence

Factor	Fedderke (2004)	Fielding (1997)	Mlambo and Nell (2000)	Heintz (2000; 2002)
Sample period, data, methodology	1970-97; panel data; 27 manufacturing sectors; panel data analysis	1946-92; aggregate (distinguishing between traded and nontraded capital); Time series analysis	1960-94; aggregate; Time series analysis	1970-93; 7 industrial sectors; panel data analysis
Demand; capacity; output		Proxy: change in real GDP at factor cost Result: positive effect Elasticity = +0.91 (nontraded); +1.07 (traded)	Proxy: change in real output Result: positive (small) effect **Elasticity: 0.0001**	Proxy: sector value added Result: positive effect **Elasticity: +0.014**
Macroeconomic uncertainty	Proxy: expected change in output Result: positive effect (largest effect); **Elasticity = +0.75**		Variability of macroeconomic environment Proxy: inflation; terms of trade, budget deficit; debt Results: all significant	
Political uncertainty	Proxy: weighted average of 11 indicators of repression Result: negative effect **Elasticity = -0.06**	Proxy: number of strikes Result: negative effect on traded capital **Elasticity: -0.09 (traded)**		Proxy: combination of prison population, detentions, strikes Result: negative effect (= factor effect) **Elasticity: -0.027**
Rate of return (level and uncertainty of return)		Proxy: combination of variability of returns and cost of capital and industrial unrest Result: negative effect on nontraded capital; positive effect on traded capital **Elasticity = -0.49 (nontraded); +0.35 (traded)**		Proxy: profit rate Result: positive effect **Elasticity: +0.027**

Table 1 (Cont'd)

Factor	Fedderke (2004)	Fielding (1997)	Mlambo and Nell (2000)	Heintz (2000; 2002)
User cost; interest rate	Proxy: real interest rate + depreciation rate + corporate tax rate Result: negative but insignificant **Elasticity = 0**	Proxy: real interest rate Result: negative effect **Elasticity = -1.36 (nontraded); -1.14 (traded)**	Proxy: real interest rate Result: negative effect **Elasticity = 0.008**	Proxy: real interest rate + depreciation + tax rate Result: negative but insignificant **Elasticity = 0**
Labor costs; wages	Proxy: real wage Result: insignificant **Elasticity = 0**	Proxy: aggregate real wage bill Result: positive (nontraded) **Elasticity = +2.50**	Proxy: unit labor cost Result: negative effect **Elasticity: -0.009**	
Government investment	Proxy: public investment Result: crowding-in **Elasticity = 0.04**	Proxy: public investment Result: positive effect **Elasticity = +0.44 (nontraded); +0.36 (traded)**	Proxy: public investment Result: positive effect **Elasticity: +0.37**	Proxy: public investment Result: positive but insignificant **Elasticity = 0**
Finance and credit	Proxy: change in operating profits Result: insignificant **Elasticity = 0**	Proxy: credit to the private sector Result: insignificant **Elasticity = 0**	Proxy: domestic credit Result: positive effect **Elasticity: +0.0003**	
Trade liberalization; Exchange rate	Proxy = (exports+imports)/value added Result: insignificant Elasticity = 0		Proxy: real exchange rate Result: negative effect **Elasticity: -0.0001**	
Fiscal policy		Proxy: (1 – effective tax on capital income $= 1 - \tau$) Result: negative (nontraded capital) **Elasticity = +2.28**	Proxy: budget deficit Result: negative effect of bond-financed deficit (no effect of money-financed deficit) **Elasticity: -0.067**	

Source: Fedderke, J.W., 2004. "Investment in fixed capital stock: Testing the impact of sectoral and systemic uncertainty." Oxford Bulletin of Economics and Statistics, 66 (2), 165-187; Fielding, D., 1997. "Aggregate investment in South Africa: A model with implications for political freedom." *Oxford Bulletin of Economics and Statistics*, 59 (3), 349-369; Heintz, James, 2000. "Political unrest, distributive conflict, and investment: the case of South Africa." Paper presented at the PERI workshop on Investment in Africa, October 2000. Heintz, James, 2002. "Political conflict and the social structure of accumulation: The case of South African apartheid." *Review of Radical Political Economics*, 34 (3), 319-326; Mlambo, K. and Kevin Nell, 2000. "Public policy and private investment in South Africa: An empirical investigation." In Elbadawi, I. and T. Hartzenberg (Eds.). *Development Issues in South Africa*. New York: St. Martin's Press, 80-109.

Table 2: Industry regression results – effects of monetary and fiscal policy factors (instrumental-variable two-way fixed effects estimates)

	Real interest rate	Nominal interest rate	Short-term interest differential with U.S.	Public investment/GDP	Government domestic debt/GDP	Exchange rate variability
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged investment	0.526	0.526	0.526	0.526	0.526	0.526
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Output growth	0.039	0.039	0.039	0.039	0.039	0.039
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.00)
Lagged output growth	0.046	0.046	0.046	0.046	0.046	0.046
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.00)
Profit	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Real unit labor costs (change)	0.015	0.016	0.015	0.015	0.015	0.015
	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)
Corporate tax rate (change)	-0.100	-0.425	-0.021	-0.049	-0.370	0.058
	(0.00)	(0.00)	(0.80)	(0.69)	(0.00)	(0.56)
Real interest rate	-0.170					
	(0.00)					
Nominal interest rate		-0.175		-0.056	-0.203	
		(0.00)		(0.25)	(0.04)	
Inflation		-0.262		-0.157	-0.307	
		(0.00)		(0.00)	(0.00)	
Interest rate differential			-0.203			
			(0.00)			
Public investment				0.415		
				(0.01)		
Government domestic debt					-0.099	
					(0.04)	
Exchange rate variability						-0.198
						(0.00)
R-sq within	0.85	0.85	0.85	0.85	0.85	0.85
R-sq between	0.99	0.99	0.99	0.98	0.99	0.99
R-sq overall	0.86	0.86	0.86	0.86	0.86	0.86
F-test for fixed effects	7.05	7.05	7.05	7.05	7.05	7.05
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

- Sample: 9 industries, 1972-2001, N=256 observations.
- The dependent variable is gross investment as a percentage of capital stock. The numbers in parentheses are the p-values.

Table 3: Manufacturing sector results – monetary and fiscal policy factors (GMM two-step results)

	Cost of capital	Real interest rate	Policy components of cost of capital	Public investment	Government domestic debt/GDP	Exchange rate variability
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged investment	.547 (0.00)	0.577 (0.00)	.608 (0.00)	.633 (0.00)	.561 (0.00)	0.513 (0.00)
Output growth	.034 (0.00)	0.030 (0.01)	.025 (0.01)	.033 (0.00)	.037 (0.00)	0.043 (0.00)
Lagged output growth	.033 (0.00)	0.016 (0.04)	.029 (0.00)	.033 (0.00)	.047 (0.00)	0.041 (0.00)
Real unit labor costs	-.052 (0.00)	-0.039 (0.09)	-.036 (0.12)	-.018 (0.43)	-.034 (0.18)	-0.033 (0.06)
Cost of capital	-0.048 (0.07)					
Real interest rate		-0.190 (0.03)				
Nominal lending rate			-.186 (0.08)	-.274 (0.02)	-.139 (0.26)	
Inflation			-.273 (0.02)	-.159 (0.28)	-.324 (0.03)	
Corporate tax rate (change)		-0.046 (0.66)	-.215 (0.03)	-.283 (0.00)	-.324 (0.01)	
Public investment				.886 (0.02)		
Government domestic debt					-.229 (0.04)	
Exchange rate variability						-0.065 (0.00)
First-order autocorrelation	-3.30 (0.001)	-3.13 (0.00)	-3.40 (0.00)	-3.44 (0.00)	-3.29 (0.00)	-3.20 (0.00)
Second-order autocorrelation	-1.27 (0.20)	-1.23 (0.22)	-1.19 (0.23)	-1.13 (0.25)	-1.21 (0.23)	-1.34 (0.18)

Sample: 27 sub-sectors of the manufacturing sector; N=756

Table 4: Estimated elasticities

variable	9 major industries			27 manufacturing subsector		
	Table (eq.)	coefficient	elasticity	Table (eq.)	coefficient	elasticity
Output(sum)	2 (1)	0.085	0.019	3 (3)	0.054	0.01
User cost of capital	Nr	0	0	3 (1)	-0.048	-0.085
Profit	2 (1)	0.0003	0.02	na	na	na
Unit labor costs (growth rate)	2 (1)	0	0	3 (1)	-0.052	-0.35
Real interest rate	2 (1)	-0.17	-0.067	3 (2)	-0.19	-0.049
Nominal interest rate	2 (2)	-0.175	-0.264	3 (3)	-0.186	-0.178
Inflation	2 (2)	-0.262	-0.293	3 (3)	-0.273	-0.19
Corporate tax rate (change)	2 (1-5)	0 to -0.425	0 to -0.003	3 (2-55)	0 to -0.324	0 to -0.001
Short-term interest rate differential	2 (3)	-0.203	-0.015		0	0
Exchange rate variability	3 (6)	-0.198	-0.182	3 (6)	-0.065	-0.044
Public investment/GDP	2 (4)	0.415	0.282	3 (4)	0.886	0.387
Government borrowing	2 (5)	-0.099	-0.350	3 (5)	-0.229	-0.552

Note: a value of 0 means that the partial effect or the elasticity is not statistically significant at the 10% level.

Table 5: Manufacturing sector – investment regressions with capacity underutilization, 1986-2001. (GMM two-step regressions)

	I (with real interest rate)	II (with nominal interest rate)	III (with public investment)	IV (public investment and debt)
Lag investment	0.498	0.399	0.488	0.455
	(0.00)	(0.00)	(0.00)	(0.00)
Output growth	0.004	0.005	0.002	0.0003
	(0.02)	(0.00)	(0.00)	(0.77)
Lag output growth				0.003
				(0.06)
Capacity underutilization	-0.200	-0.240	-0.236	-0.285
	(0.00)	(0.00)	(0.00)	(0.00)
Corporate tax	-0.251	-0.216		
	(0.00)	(0.01)		
Real interest rate	-0.024		-0.022	
	(0.00)		(0.00)	
Nominal interest rate		-0.306		
		(0.00)		
Inflation		-0.051		
		(0.00)		
Public investment			0.203	0.508
			(0.02)	(0.00)
Domestic debt				-0.818
				(0.00)
First-order autocorrelation	-3.63	-3.27	-3.65	-3.82
	(0.00)	(0.00)	(0.00)	(0.00)
Second-order autocorrelation	-0.61	-0.86	-0.87	-0.95
	(0.54)	(0.39)	(0.38)	(0.34)

Number of observations = 341 (except in column IV where N=366).
Note: All variables are in logarithm except for output growth, the real interest rate, and inflation. For variables in logs, the coefficients are the associated elasticities of investment. The real interest rate elasticity of investment can be computed by multiplying the coefficient on the real interest rate and the average real interest rate over the regression period (=6.74), which yields -0.16 and -0.17 in equations I and III, respectively.

Table A1: Monetary policy regimes in South Africa, 1960-todate

Period	Monetary regime	Main features of monetary policy and context
1960-1980	Liquid asset/Deposits ratio-based system with quantitative controls over interest rates and credit	- Main focus is on liquid assets/deposits requirements. Rationale: limited supply of and yields on liquid assets contain bank lending and thus money supply; minor role of the interest rate. - Starting from 1973, the SARB begins setting accommodation rates above money market rates, which raises interest rates; Direct limits on bank credit cause disintermediation
1981-1985	Mixed system during transition	- Gradual change from liquid assets/deposits ratio-based system to cost of reserves system (in effect in Mid-1985) Gradual removal of credit ceilings - Reforms recommended by the De Kock Commission. - 1979-80 oil price hikes, low interest rates, and high money growth contribute to "overheated economy".
1986 to February 1998	Cost of cash reserves-based system with pre-announced monetary targets (M3)	- Reforms following recommendations by the De Kock Commission; Also new Bank Governor (Dr. Chris Stals) more "conservative" (in the sense of inflation aversion) - The Reserve Bank announces annually the targeted growth rate for M3, from 1986 to 1998. - Targets are to be achieved by changing the interest rate; short term rate is the main monetary policy instrument - The 'Bank rate' is used to control demand for bank credit; indirect monetary policy control through the control of money demand.
March 1998 to January 2000	Repo system: daily tenders of liquidity through repurchase transactions + pre-announced M3 targets + informal targets of core inflation (1-5% range)	- Breakdown of the money growth,-output growth relationship, partly due to financial liberalization and various structural changes; Result: consistent overshooting of the M3 growth target (target hit only 5 out of 15 years from 1986 to 2000). - March 1998: a new system of monetary accommodation is announced (the repurchase system) - Objective of rationing the amount of liquidity in the financial system. - The Reserve Bank announced its desire to reduce inflation to levels prevailing among major trading partners - Informal targeting of overall inflation rate in the 1-5% range - Greater transparency and credibility become part of the main objectives of the monetary policy orientation
February 2000 – to date	Explicit inflation targeting with a range of 3-6% for the CPIX	- February 2000: The Reserve Bank declares inflation targeting as the primary focus of monetary policy.

Table A2: Summary statistics (9 industries; 27 manufacturing sub-sectors) (1972-2001)

|	9 industries			27 manufacturing sub-sectors		
	obs	mean	std. dev.	obs	mean	std. dev.
Investment/capital stock (%)	270	10.55	5.06	810	16.31	10.59
Real gdp growth (%)	270	2.41	6.21	810	2.48	11.92
Cost of capital	270	16.36	8.05	810	23.62	8.11
Real labor cost (growth rate, %)	265	4.25	4.35	810	4.58	7.93
Employment growth (%)	265	0.05	4.87	810	0.34	6.27
Wage-productivity gap (growth differential, %) 1972-2001	265	0.16	6.97	810	0.08	11.41
Wage-productivity gap (growth differential, %) 1986-2001	139	-0.56	6.19	405	-1.46	11.20
Aggregate indicators						
Lending rate (%)		15.61	4.20			
Real lending rate (%)		4.21	5.34			
Inflation (%)		11.41	3.58			
Corporate tax (%)		13.94	3.14			
Real short-term interest differential (%)		-0.67	4.94			
Real long-term interest differential (%)		-1.14	3.97			
Real exchange rate variability (%)		11.12	8.20			
Public investment/GDP (%)		7.19	2.54			
Government domestic borrowing/GDP (%)		37.22	6.29			

Table A3: Summary statistics - manufacturing sub-sector (averages 1986-2001)

| Sub-sector	Investment /capital stock ratio (%)	Output growth (%)	Total capacity under-utilization (%)	underutilization due to insufficient demand (%)	Wage – productivity gap (%)*	Employment growth (%)
Basic chemicals	11.1	2.0	17.3	65.5	-2.2	-0.4
Beverages	14.6	2.0	25.4	64.7	-0.4	-2.0
Basic iron metals	10.7	3.1	13.5	73.2	-5.7	-5.0
Electrical machinery	12.7	0.0	23.1	73.2	0.5	1.2
Fabricated metal	17.3	0.1	22.6	74.8	-1.2	-1.6
Food products	12.8	1.0	20.0	55.5	-0.3	-1.2
Furniture	16.9	2.5	20.6	72.4	-0.4	1.1
Foot wear	12.7	-1.5	14.9	75.3	-3.7	-5.4
Scientific instruments	17.7	2.0	17.8	78.1	-0.6	-0.9
Leather	19.8	0.6	14.7	58.8	-1.9	-0.6
Machinery	12.2	-1.1	25.0	75.4	-3.2	-1.6
Glass	13.0	1.6	12.3	72.1	0.4	-1.6
Motor vehicle & parts	18.3	3.4	25.4	64.6	-4.5	-0.4
Non-ferrous metals	20.1	8.2	10.8	57.5	-8.9	-4.0
Other chemicals	9.1	1.2	22.0	73.4	-0.6	-0.9
Tobacco products	15.3	-3.1	16.9	65.2	-0.6	-0.9
Non-metal minerals	7.8	0.1	22.7	82.5	-1.5	-4.4
Paper & paper products	17.4	2.4	12.2	66.6	0.7	0.1
Coke and petroleum products	6.5	-1.2	12.5	68.5	-0.6	-0.9
Plastic products	23.4	5.9	22.1	78.1	0.7	3.9
Printing & publishing	17.1	1.8	16.6	76.5	2.7	1.9
Television, radio equipment	18.6	3.6	24.4	87.8	-0.6	-0.9
Rubber products	15.2	0.6	18.5	62.3	-4.4	-2.2
Other transport equipment	8.8	-3.0	30.1	82.8	-2.5	-3.1
Textile products	16.0	-1.6	19.3	69.4	-2.3	-3.6
Apparel	17.3	1.1	13.3	62.3	0.0	-0.3
Wood products	11.8	1.2	14.3	63.6	1.4	1.9

Source: author's computation from TIPS and SARB data.

* wage-productivity gap = growth rate of real wages – growth rate of labor productivity.

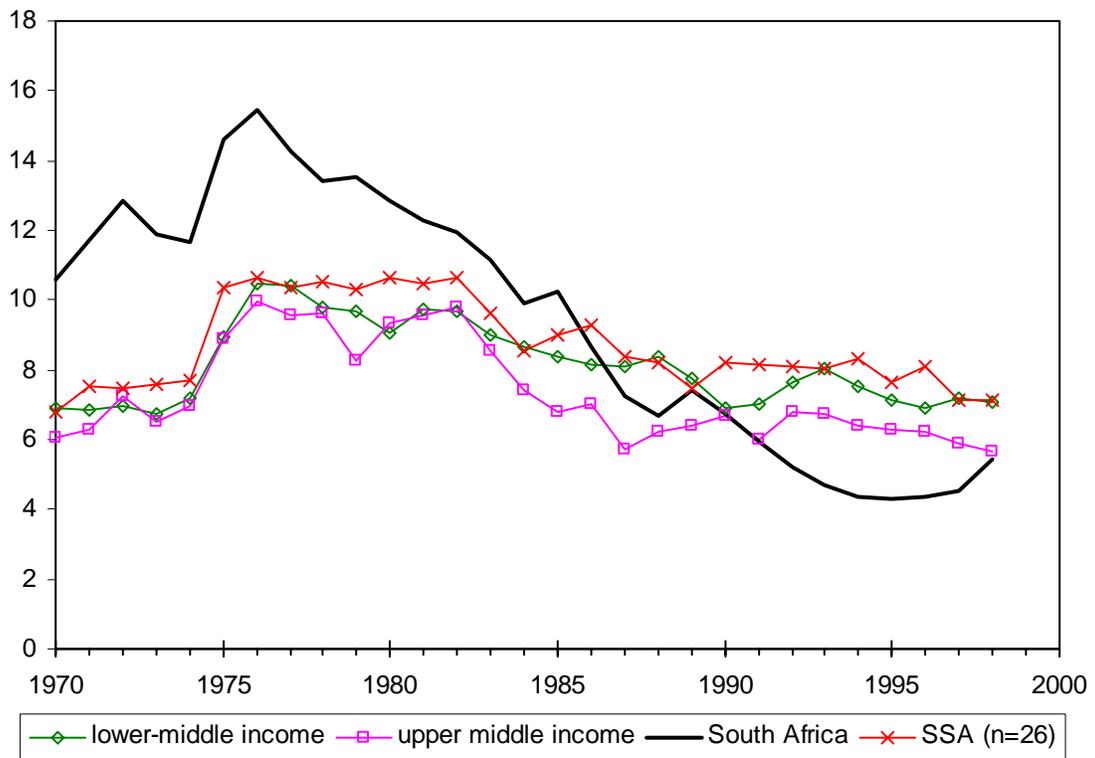**Figure 1: Total investment (% of GDP)**
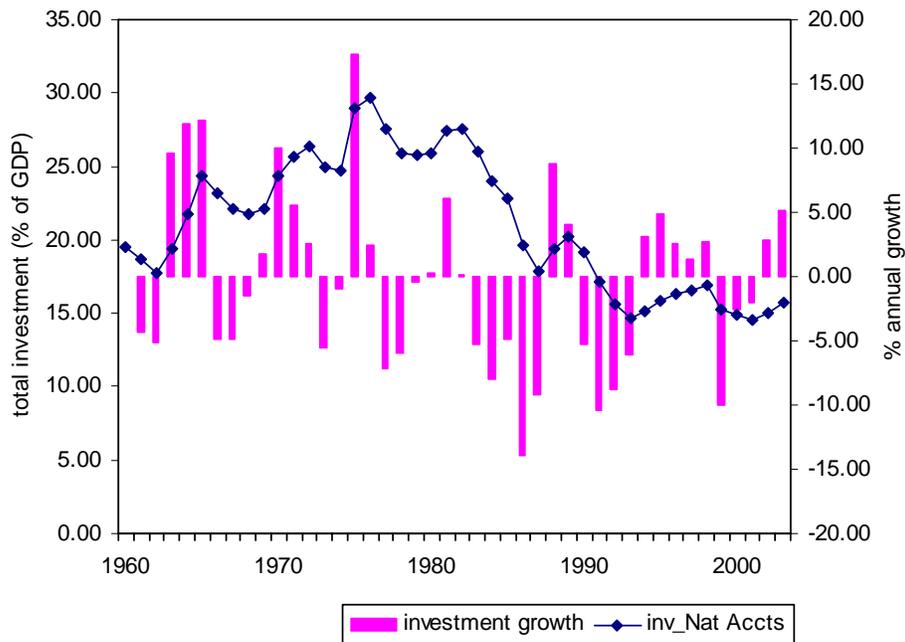
Source: SARB, National Accounts

Figure 2: Gross capital formation, public and private (% of GDP)
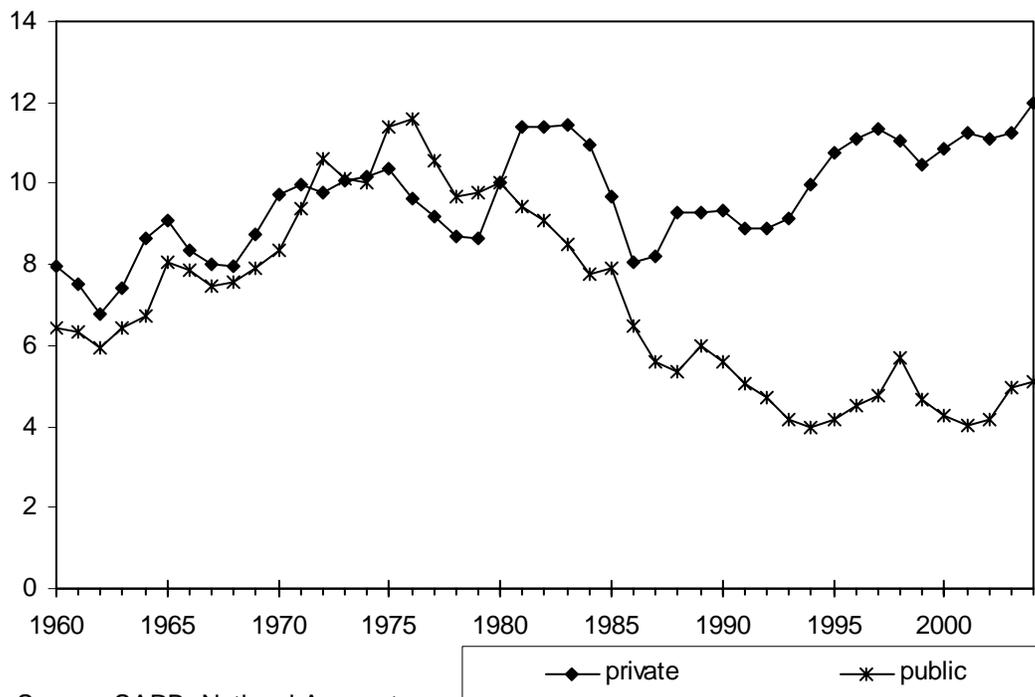
Source: SARB, National Accounts

Figure 3: Public investment: South Africa vs. other developing countries

source: Global Development Network database

Figure 4: Short term real interest rate differential between South Africa and the USA and the UK
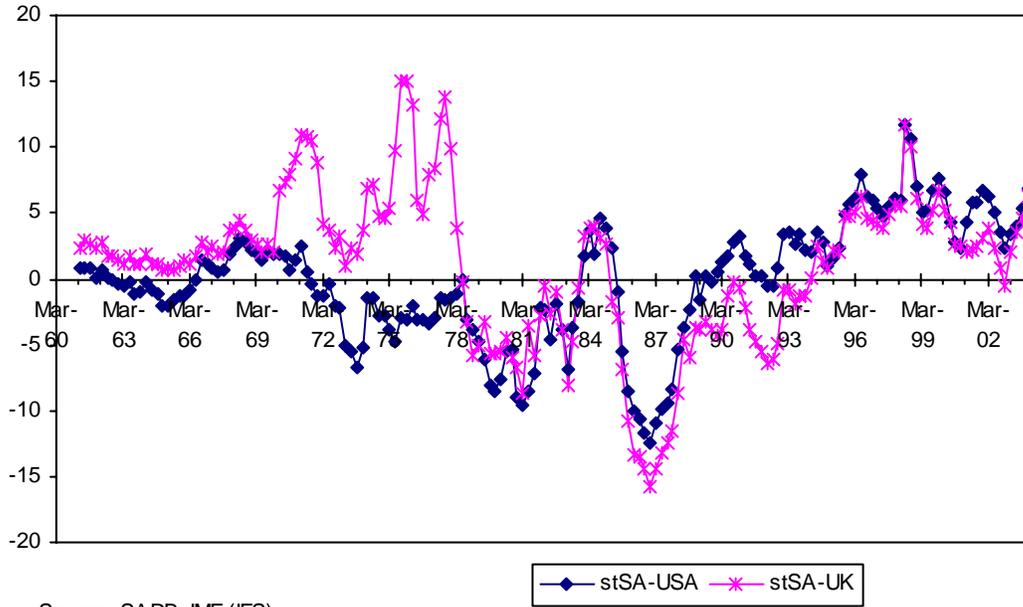

Source: SARB; IMF (IFS)

Figure 5: Government expenditure, revenue, and debt (% of GDP)

Source: IMF (IFS