South Africa

Economic Performance and Policies

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In addition, a number of technical and seminar papers prepared by World Bank staff and South African counterparts in key sectors have been discussed in the country.
FOREWORD

This study is published by the World Bank in its informal series of Discussion Papers on the South African economy. It draws on research carried out with the support of a broadly-representative group of South Africans, and involving South African institutions and researchers. Working drafts, and an abstract of findings, have been used at workshops with counterpart groups in South Africa.

The study examines the challenge of promoting equitable and fiscally sustainable growth and evaluates alternative paths to growth using an econometric model developed by World Bank staff. The broad conclusion is that there needs to be greater complementarity between stimulating the economy through public investment and reviving private investment if South Africa is to achieve a sustainable growth. The prospects of success will be improved considerably if skills are upgraded and a reorientation towards exports is achieved, accompanied by a restructuring of public expenditure -- within fiscally sustainable limits -- for targeting the poor. The scenarios examined assume that political stability is achieved and that access to international capital markets improves.

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PART I

OVERVIEW
OVERVIEW

1. Introduction

Much of South Africa's economic future will depend on what happens in the next few years. Although the country is only emerging now from a deep five-year recession, it has much in its favor. It is rich in natural resources (minerals); its economy (in monetary and exchange-rate policies) is well-managed; and its annual income per capita (USD 2,600) puts it in the upper middle-income bracket for developing countries. The recent 1988-1993 recession, the longest in South Africa's history, is due partly to a nose-dive in investment by parastatals in 1985 and to lack of consumer and business confidence. Yet South Africa's economic problems run much deeper. For 30 years, GDP growth has been declining; unemployment has increased dramatically; and inequality between blacks and whites (employment, income, education and access to other public services) is almost as wide as ever.

This paper addresses one question: how can South Africa move on to a much faster growth path in which the poorer majority of its citizens gain the most? Growth without such redistribution is almost certainly unsustainable, as it would falter as social tensions rose. Two prime requirements of redistributive growth are fast employment creation and narrowing the gap in provision of public services across racial groups. The analysis outlined here suggests that such a growth path can be achieved if the right policies are in place and other conditions are met. There are four main conclusions:

- Sustained growth requires an ongoing improvement in the supply-side of the economy. This can be encouraged by improving export incentives and the skills of the labor force. A revival of demand within the economy can lead to only a limited amount of growth. However, kick-starting the economy through public expenditures could play an important role: well-targeted public investment will help redistribution while assisting economic recovery.

- Private investment must increase from its currently depressed level if sustainable growth is to be attained. Higher private investment would stimulate demand, but its more important role is to increase supply. To raise private investment, policies need to be transparent, credible and stable. Excessive fiscal deficits are likely to send the wrong signals.

- Redistribution can be achieved through a number of avenues. Public expenditure can be diverted towards investment in activities benefiting the disadvantaged, and a significant proportion of the backlog in social expenditures can be cleared in a few years without breaking important macroeconomic constraints. Unskilled and semi-skilled workers can be upgraded to higher levels, but this must be supported by improved basic education for blacks. A modest
program of rural resettlement based on a willing-buyer-willing-seller exchange should create employment and be affordable. Encouraging the development of small enterprises should also be redistributive and consistent with higher growth.

Redistribution through immediate pay increases to lower-paid workers and excessive public expenditure is unsustainable. The results of such policies, are likely to include increased inflation and pressure on the balance of payments.

2. The Economy

Slower Growth

South Africa's real GDP growth has been declining since 1965. In the first half of the 1960s, it was almost 6 percent per year; by the late 1980s, it had fallen to around 1 percent. With population growing at about 2.6 percent each year, per-capita GDP growth has been negative since 1982. It plunged after the Soweto uprising of 1976 and after financial sanctions were imposed in 1985. Despite a recovery in 1986-88, growth has been increasingly influenced by continuing political uncertainty and growing social unrest. Growth in the economy has become increasingly unstable.
For many years, the chronic decline in growth was accompanied by a high (and increasing) ratio of investment to GDP. South Africa was investing an increasing share of its income and receiving less in economic growth. Total factor productivity (TFP)\(^1\) growth declined markedly throughout the 1970s, becoming negative in the 1980s. Indeed, in three important sectors of the economy (agriculture, mining and manufacturing), growth fell and productivity faltered.

**Agriculture.** Capital intensity and a highly regulated and protected environment for white agriculture resulted in huge investments but low growth in agricultural efficiency. While yields per hectare exceed Africa's average by about 50 percent, they compare unfavorably with the rest of the world. Over the past 20 years, physical yields of major domestic crops have increased only moderately, and maize yields (44 percent of crop area) have been virtually stagnant since 1970. The sector is extraordinarily capital-intensive -- the capital/output ratio in agriculture has been as high as three times that of manufacturing -- and the total factor productivity of South Africa's main crops increased only modestly between 1960 and 1989.

**Mining.** In the 1960s, mining productivity (as measured by the output/capital ratio) increased steadily, reflecting stable technology and improved efficiency. Despite stagnation in output since the early 1970s, capital stock increased rapidly. Between 1970 and 1980, it grew at 6.6 percent a year. Output, however, declined at 1 percent a year. Similar trends continued during the 1980s.

**Manufacturing.** From 1950 to about 1970, the growth of capital stock in manufacturing was about equal to output growth. Thus, capital productivity was relatively stable. Since then, it has fallen (despite a decline in output growth) as the capital stock continued to grow, because of low real interest rates, higher wages, and increased investment in heavy intermediate goods.

In the past 20 years, South Africa's manufacturing sector has been characterized by low (and occasionally negative) total factor productivity growth, and average annual capital stock growth of 5 percent combined with lower employment and output growth. In 1960-72, there was a rapid increase in labor productivity without any change in the productivity of capital. In 1972-90, however, capital productivity declined significantly at almost -3 percent a year, and labor productivity growth slowed to about 1 percent a year. Between 1972 and 1983, there was a huge fall in capital productivity as a result of large "strategic" investments in chemicals. After 1983, there was a major recession with low output growth, absolute declines in capital stock and anemic growth in labor productivity. Total factor productivity growth was low -- 0.5 percent per year -- over the past twenty years. Such low TFP growth is well below the levels achieved in high-performing economies.

**Rising Unemployment**

Employment growth has deteriorated consistently since 1970, with a shift away from agriculture. It peaked for all racial groups in the 1960s, and has declined ever since. Labor supply growth, however, changed little over the past 30 years although lower net immigration reduced growth in white labor supply. Growth in the African labor force increased from 2.5 percent in the early 1960s
to 2.8 percent a year in the 1980s. For Asians and Coloreds, it declined from 2.8 percent to 2.6 percent, while for whites it fell from 2.8 percent to 1.6 percent. Consequently, there has been a growing imbalance between black labor supply and employment in the formal sector. That gap has been filled only partly by growth in the informal sector due to increased ineffectiveness and later removal of apartheid-linked regulations. Unemployment has thus grown rapidly among blacks. In contrast, there was full employment among whites up to 1985, but since then white unemployment has grown significantly.

Less than half of the black labor force hold jobs in the formal sector. Although subsistence agriculture in the homelands and the informal sector provide an invaluable source of employment for the rest, roughly one quarter of blacks are without work. Unemployment is disproportionately concentrated among females and young people, and only a few new entrants to the labor market can expect to find wage jobs. Black unemployment on such a scale is not only a great waste of resources; it fuels social unrest.

**Extreme Inequality**

Apartheid intensified inequality in South Africa beyond that expected in a country at its level of development. Although it is an upper-middle-income country, most of South Africa's national income goes to the white minority. Whites have personal incomes per capita of about 9.5 times those of Africans, 4.5 times those of Coloreds and 3.0 times those of Asians. While social indicators for whites (such as infant mortality and life expectancy at birth) are in the range for developed countries, those for the African majority are broadly comparable with poorer surrounding countries. Such extremes tend to confirm that there are really two South Africas -- a First-World society for whites and a Third-World society for blacks.

But there is evidence that income inequality across the races has narrowed. Since 1970, the share of personal income accruing to whites has declined substantially, while the share for Africans increased from 22.3 percent to 31.5 percent in 1987. This has been accompanied by a clear narrowing of the proportionate gap between whites and other racial groups, thanks partly to above-average wage increases for Africans from the early 1970s onwards. Despite slower growth in African employment, their share of wage income rose from an estimated 31.6 percent in 1975 to 38 percent in 1987. But given slower growth in African real wages since 1989, this progress has faltered.

In most areas of government expenditure, apartheid worked in favor of whites and further increased the differences in welfare across racial groups. This has resulted in wide disparities in access to public services including water, sanitation, electricity, education and health. White preference in the civil service and major parastatals was used to support white employment.

In its white cities, South Africa ranks among the top four or five countries in the world in per-capita spending on infrastructure. Yet urban areas have worse facilities on average than other developing countries with similar per-capita income. This is evident in such indicators as the extent of squatting, lack of electricity, poor access to water supply and inadequate sanitation. In the PWV urban area -- the strongest economic region of South Africa -- almost 70 percent of African households have no direct access to water, and about 50 percent live in shanty towns.
In education, the picture is the same. Education is compulsory for white children. Not so for African children, 25 percent of whom are not schooled. For those that are, the quality of basic education is deplorable. This is hardly surprising. Public spending per pupil in 1990 was more than four times higher for whites than for Africans. Teachers are poorly trained, schools are badly managed, and basic instructional facilities and materials are in short supply. It is common to find 80-100 black children in a schoolroom designed for 40. The result is poor academic performance. In 1991 only 11 percent of Africans who sat for Standard 10 examinations qualified for university, compared to more than 70 percent for whites and Asians.

**The Present Crisis**

Since 1989 the South African economy has been in a deepening recession which has exacerbated unemployment. GDP growth was -0.6 percent in 1990 and 1991. In 1992 it dropped further to -2.1 percent, due partly to an unusually severe drought. Even so, many indicators strongly suggest that the economy is being driven by falling aggregate demand.

Consider these facts. First, private investment dropped absolutely in real terms between 1989 and end-1992.

**Figure 2:**

![Graph showing percentage of labor force without wage employment in South Africa from 1965 to 2000.](image-url)
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As a percentage of GDP, it fell from 13.3 percent in 1988 to 11.4 percent in 1992. Second, employment in the non-agricultural sectors fell by about 4.9 percent between mid-1989 and December 1992. Third, the Central Statistical Services' measure of capacity utilization in manufacturing shows a fall of over seven percentage points during 1989-92. Fourth, all three composite business cycle indicators, as calculated by the South Africa Reserve Bank, show comparable declines. And various measures indicate that business confidence has flagged severely in recent years.

A weak recovery is now underway. In 1993, GDP may have grown by as much as 1 percent. Business confidence seems to be rising given higher exports and the lifting of most remaining sanctions. But, private investment continued to decline over much of the year, although a renewal in foreign investment is hoped for.

The 1989-1993 recession is rooted in the demand shock that followed a substantial and sustained fall in parastatal investments after 1985. It intensified as private-sector confidence declined with growing political uncertainty and social turmoil. In the present circumstances, it is difficult for the authorities to stimulate the economy and resume positive growth. They face constraints concerning the balance-of-payments, the fiscal deficit, and the need to keep inflation under control.

Balance-of-payments problems have greatly constrained the economy in recent years as limited access to international finance has meant that the external current account has had to remain in surplus. In mid-1988 the current account started to slip into deficit following moderate growth in the economy. To protect foreign exchange reserves and dampen inflation following depreciation of the rand, interest rates were raised and new import duties were imposed. This curbed growth and pushed the economy back into recession. Balance-of-payments considerations were less of a problem before 1985; it was possible to cover current account deficits by overseas borrowing. However, this became more difficult after the Debt Moratorium was imposed and financial sanctions were intensified.

Gross foreign exchange reserves stood at only about 1.1 months of imports at end-September 1993, and this position would rapidly deteriorate under renewed balance-of-payments pressure. In such circumstances South Africa would be forced to generate current-account surpluses, making it hard to see stable growth emerging.

The fiscal deficit (the excess of government spending over revenues) was not much of a problem until recently. It becomes a problem when it crowds-out private investment, or leads to balance-of-payments difficulties and inflation. Elsewhere (in sub-Saharan Africa and Latin America, for instance), governments ran up unsustainable deficits, with disastrous economic results, when they attempted to create growth and redistribution through massive public spending and subsidies to parastatals. In the past, the South African authorities managed to avoid such excessive fiscal deficits and public debt. That has now changed. The fiscal deficit grew rapidly over 1991 and 1992. The budget deficit for FY 1992/93 reached a record 8.6 percent of GDP, due mainly to lower-than-expected revenues. There is no sign of this large deficit leading to higher aggregate demand, as the effect of the increased deficit is being offset by a decline in private investment.
From 1981-91, South Africa’s inflation hovered at 15 percent per year, while in the OECD countries it averaged about 3 percent. Until recently, it could be argued that expectations on inflation had settled down to something close to the actual level, so that uncertainties about prices and wages had largely been eliminated. Any significant increase in inflation, however, would foster greater social discontent.

Only in the past year or so has inflation fallen. In 1992, it was 13.9 percent, despite a rapid increase in food prices after the drought. However, inflation in food prices is declining, and inflation is likely to be around the 10 percent mark in 1993. This is due mainly to the deepening recession and the mild appreciation of the real effective exchange rate in recent years.

The Brighter Side

There are some rays of hope. Although the country is in a deep recession, rapid growth is possible in the early years of a new administration. As of end-1992, GDP could be raised by 9 percent with investments only just sufficient to maintain existing capital stock. This figure was unusually high, however, given the severe drought in that year; it may have decreased in 1993 to around 8 percent.

Thanks to substantial public investment in the past, there is underutilization in much of the country’s infrastructure and in power-generation. South Africa has a considerable advantage over other countries at a similar stage of development. Little new investment will be needed over the coming years in substantial parts of the transport and communication systems or in electricity generation.

As a result of financial sanctions, South Africa has an unusually low foreign debt-to-GDP ratio (see Figure 4). So if foreign finance can be secured, higher investment could be partly financed by external sources. South Africa is not in the foreign debt trap faced by some countries in Latin America and Eastern Europe. Savings as a percentage of private disposable income is unusually high. If dis-saving by the public sector can be controlled, and productivity increased, South Africa could maintain a high level of investment relative to GDP within a sustainable balance-of-payments position.

3. Why the Decline?

Why did high investment not generate more jobs and more satisfactory growth? There are many reasons.

First, growth of the economy’s capital stock has had an important influence. Both investment and growth in the capital stock declined during the 1980s. This was accompanied by a substantial increase in the capital intensity of the economy which further hampered employment growth. Second, there has been a deterioration in the allocation of capital stock. Investment was increasingly channeled towards activities with lower-than-average capital productivity such as in the public sector. Third, there has been inadequate acquisition of skills within the workforce: this has lowered the returns to investment and slowed productivity growth. Fourth, there has been a probable decline in work input among the unskilled. Finally, rising wages and industrial unrest since the early 1980s further dampened employment growth.

Declining Investment

While the investment level in South
Africa has been a major influence on economic growth, its decline after 1975 cannot wholly explain falling GDP growth. Following heavy investment in the 1960s and mid-1970s, the capital stock grew rapidly. While the capital stock has continued to grow, its rate of growth has steadily declined. Through 1960-67, there was little difference in the rates of GDP and capital-stock growth and the output-to-capital ratio was constant. Over 1967-88, the output-to-capital ratio declined by as much as 3 percent a year, and it has since remained roughly constant. Movements in capital-stock growth alone cannot explain the progressive decline in GDP growth.

It is important to first distinguish between public and private sector investment. Public investment had three main aims: to extend and develop infrastructure (mainly in white areas); to expand public utilities; and to promote self-sufficiency in parts of the economy likely to be affected by sanctions. It grew rapidly from 1946 until 1979-80.

**Figure 3:**

![Graph showing South Africa Government Fiscal Account and Current Account as a % of GDP](image-url)
Since then, the trend has been dramatically reversed with first a modest decline of 13 percent in 1981-85 and then a much more precipitous fall of 52 percent from 1986-92. Investment by government was the first to start falling in 1976-1980, followed by a decline in parastatal investment after 1979, that became more pronounced after 1985. This was in part due to the privatization of two major parastatals in the late 1980s.

Movements in private investment closely parallel those of the parastatals, but show a clearer-cut response to booms and recessions. World Bank research suggests that the private sector responds positively to changes in public-sector-generated demand. This underlines the importance of the public sector and its actions on other parts of the economy. An expansionary policy by government or parastatals has tended to stimulate the economy and hence private investment.

Investment has been driven largely by internal forces. Historically, exports were generated by mining and manufacturing; other sectors were pulled along by import-substitution policies. The potential for further import substitution has been exhausted. The supply side of the economy has increasingly been driven by changes in domestic aggregate demand through population growth, movements in the terms of trade, other internal and external disturbances, and actions of the government. The private sector has been relatively passive. The secular increase in government spending as a proportion of GDP kept much of the economy at near-full capacity for many
years but contributed to a gradual fall in capital productivity and decline in the growth of GDP and employment.

The past three years saw a marked change. The fiscal deficit has risen rapidly, but private investment has slumped. What is the most likely explanation? Private-sector confidence has been shaken badly by growing political uncertainty and rising violence. Growth in public expenditure over recent years has been entirely in government consumption, while public investment is at a low level relative to GDP.

These negative developments have not been helped by a trade regime that is extremely product-specific and biased towards production for the domestic market. This, coupled with sanctions, has created an environment in which many South African producers have not expanded into a much larger world market. The result is that the economy has not fully benefited from the efficiency gains associated with international trade. Exports have been used to utilize spare capacity rather than as an engine of growth.

Redirect of Investment

Although the expansion of public investment stimulated the private sector, it also increased the share of capital stock in sectors with much lower-than-average output-capital ratios and higher-than-average capital-labor ratios. The result was slower growth in output and employment. Furthermore, overinvestment in the parastatal sector has led to substantial underused capacity.

Figure 5:
The productivity of capital (that is, the output-to-capital ratio) is higher in the private sector than in parastatals. The difference in absolute terms between the output-to-capital ratio in the private sector (about 0.6) and that of parastatals (less than 0.2) is particularly striking. Capital productivity shows a general declining trend (-0.9 percent a year for the private sector and -0.6 percent for the parastatals) in 1961-92.

In 1961 the private sector accounted for 53.4 percent of total capital stock, but by 1980, the figure was 42.3 percent. In the 1960s government experienced the fastest growth in its capital stock, but in the 1970s and first half of the 1980s, this distinction belonged to parastatals. The biggest parastatal investments were in transport (railways and ports) and in telecommunications and electricity. The result is substantial excess capacity in major utilities such as the railways and in some sectors in manufacturing, for example iron, steel and synthetic fuels.

The redirection of capital stock away from the private sector towards parastatals has had a big impact on GDP growth. When more investment resources are allocated to sectors with lower productivity, there is a depression in the level and rate of growth in GDP. This effect was particularly strong in the second half of the 1970s and in the early 1980s.

It is also likely that policies have contributed to declining capital productivity within the private sector (see Figure 5.). Such policies have included high depreciation allowances for tax purposes and special programs such as those enjoyed by the motor vehicle industry. In addition, the most capital-intensive sector, mining, receives special tax advantages, while large-scale agriculture benefited for many years from subsidized and officially-supported prices. Within manufacturing, the cost of capital is lower in the more capital-intensive industries, and this may have encouraged a re-channeling of investment towards industries with low capital productivity.

Insufficient Improvement in Skills

There is huge inequality in skills across different parts of the labor force in South Africa. The occupational structure of black and white workers is highly unequal. South Africa's total labor force is relatively uneducated and unskilled compared to other countries at a comparable stage of development. Given the overall capital-intensity of South Africa, there is a clear imbalance between the 'quality' of labor and the size of the capital stock. Although some upgrading of labor force skills has taken place recently, this imbalance has persisted. One cause of reduced economic growth is that labor input has failed to keep pace with capital growth.

Movements in the racial composition of employment give a first approximation of changes in the skills mix over time. By this measure, the quality of workers in wage employment changed little in the 1970s and mid-1980s, as white and black rates of employment growth were roughly similar. As white employment grew slightly faster than that of blacks in the latter half of the 1980s, labor quality improved by this measure. This understates true labor quality improvements, however, as the educational attainment of blacks increased. The number of blacks in the labor force with little or no education fell markedly from 1970-85, although at diploma and degree level little changed. Occupational
surveys of employees also suggest that skill levels have increased in the past 20 years. In administrative, professional and clerical occupations (for selected years between 1960-85), the skill levels of Asians and Coloreds grew more quickly than those of other groups. The growth in white skills was slowest. While this indicator is crude, it is consistent with the view of the National Manpower Commission which estimates that blacks as a percentage of high-level manpower increased from 25.5 percent in 1965 to 35.6 percent in 1989.

Even after adjusting for improvement in labor quality through increased education, growth in labor input has failed to keep pace with growth of capital stock. It is estimated that capital grew 2.3 percent faster per annum than labor input over 1970-85. This result is entirely consistent with the decline in capital-productivity.

Returns (in terms of additional growth) to raising the skills of the labor force, and in particular those of blacks, are likely to be high. In the past, economic upturns have always been quickly accompanied by shortages of skilled labor. There can be little doubt that renewed economic growth in South Africa will have the same consequences, and that skill accumulation should become a policy priority.

Deterioration in the Work Input of Unskilled Labor

There is a strongly-held view in South Africa that the work effort of the unskilled workforce has deteriorated. There are two plausible reasons. First, the environment in which many black workers live has become less attractive. This may have reduced their effectiveness in the workplace. Second, there has been a dramatic increase in workdays lost through strikes and other types of industrial action.

One effect of apartheid-related controls on the urban influx was to break up many families, with breadwinners in the towns and cities and other family members back in the homelands. This has changed considerably; African urbanization has mushroomed in the townships. However, Africans, in particular, but also Asians and Coloreds, still live long distances from urban centers and places of employment. Black workers often have a long journey to and from work, and many Africans still commute daily from the homelands. It has been estimated that their average commuting distance is as much as three times that of unskilled workers in more developed countries. Distorted patterns of residential location could be expected to raise the supply price of black labor, and to lower the effectiveness of such workers through increased fatigue. The locational structure is hardly conducive to development of the informal sector. Women are especially adversely affected, given their greater need to work near the home.

The rights of African workers to organize in trade unions were progressively restricted between 1953 and 1959. That changed substantially in 1979, when registered African unions were re-legalized. The effect has been staggering. In 1980, only about 1.2 percent of African employees were union members; by 1990, it was more than 30 percent. This has been accompanied by a surge in the number of strikes involving Africans and the total of workdays lost. In 1980, about 175,000 workdays were lost; by 1992, this figure stood at nearly 1.7 million.

South African employers often claim that industrial unrest is an important impedi-
ment to future expansion. 'Labor problems' are often cited as the most common cause of greater capital intensity. One possible interpretation is that industrial conflict has widened the margin between the perceived cost of employing a worker and the wage paid.

Rising Cost of Labor

In the natural growth path of a country such as South Africa the surplus resource (unskilled black labor) is absorbed quickly into productive employment. Such a path is hampered, however, if the real wage of unskilled labor rises before the labor surplus is exhausted or if the cost of capital is artificially lowered. This raises capital intensity, lowers capital productivity and slows growth in output and employment. In South Africa both growth-inhibiting influences have occurred.

Under apartheid, highly-paid jobs were almost exclusively the preserve of whites. Black access to the formal sector was restricted to unskilled jobs, and black wages were much below those of whites (see Figure 7). As the apartheid system broke down and various social pressures came into play, black wages started to rise. Various influences have put upward pressure on the African wage--increased strike activity; the decline and abolition of influx controls; and the tendency for African real wages to move towards white real wages. Earlier work indicates that movements in the real black wage contributed to the slowdown in employment growth over 1970-85 (see Figure 6). In the absence of such changes, it is estimated that employment of blacks and real GDP would have been, respectively, about 14 percent and 3 percent higher in 1985. Although important, the historical change in relative factor prices can only account for a minor part of declining employ-

4. The Future Policy Framework

For higher growth, South Africa must revive the private sector and, at the same time, maximize employment growth and narrow income differentials between blacks and whites. It must also redress massive inequalities in access to public services and facilities, and in land ownership. The suggested policy framework outlined here focuses on the medium-to-long run. There will be other short-run problems of economic management, although these will be less severe the more rapidly the framework is implemented.

The main policies should be:

- Encouraging rapid growth in skilled labor, particularly by upgrading semi-skilled and unskilled workers;

- Encouraging a reorientation of manufacturing towards exports;

- Emphasizing job creation in small businesses and in agriculture;

- Restructuring government expenditure by raising investment in infrastructure and public services, targeting the poor and underprivileged, and restricting the growth of recurrent spending to meet budgetary targets;

- Maintaining prudent fiscal and monetary policies.

This policy strategy will only be successful if there is a major revival in private investment. If sufficient private investment is available, then sustained per-capita growth becomes a reality. Direct foreign investment
South Africa: Economic Performance and Policies

should be encouraged, and the regulatory framework should present no obstacles to new ventures. The visible implementation of redistributive policies through greater public investment should improve social stability. But it is equally important that investors should not be discouraged by an opaque and ever-changing policy framework.

Transparency, stability, and credibility -- all these matter as much as policies. To stimulate growth, the single most important ingredient is investor confidence. Political and economic uncertainties are disincentives to invest. Investor confidence will only materialize if policymaking is transparent and there are no sudden and unexpected shifts in economic policies. Just as the new governments in the transition economies of Eastern Europe have a window of opportunity, so South Africa's new government has a unique opportunity to introduce sustainable, consistent, and credible economic policies -- and to thus encourage political stability.

Past policy regimes have not met these criteria. Subsidies and tax incentives have been applied unevenly and non-transparently. The system of trade protection has accommodated the needs of large corporations. These shortcomings should be remedied.

Skill Accumulation

On the supply side, expansion of skilled labor is needed to make growth sustainable and ease the upward pressure on wages as the economy moves back to full capacity. This will have positive effects on GDP and employment growth. It is likely to increase capital productivity by removing the major constraints that effectively linked skill accumulation to growth in white labor supply. Skills upgrading should also encourage rapid growth in the employment of unskilled labor, as the returns are higher when complemented by greater skills of other workers. This will counteract inflationary pressure from growing white wages and (perhaps) reduce black wage growth as pressure for catching-up is reduced. Most important this will lead to a substantial increase in income equality. This would arise from faster wage employment growth among blacks and greater stimulus to the informal sector; higher average wages among blacks arising from skills-upgrading; and lower wage growth among skilled (mainly white) workers.

Education and training in South Africa are inadequate for improving income redistribution and for assuring future growth. Recently greater emphasis has been placed on reallocating expenditure towards education; this will probably continue under any new administration. However, investment on a much broader basis is needed to provide good social returns and be consistent with higher growth in the long-run. The quality of education for children of disadvantaged groups should be improved, while the balance between technical and general education at higher levels should be closely monitored.
Figure 6:

SOUTH AFRICA - Percentage of Unskilled Labor Force out of Wage Employment (left scale) & Real Wage of Unskilled Labor (in 1985 Rands per month) (right scale)

Figure 7:

SOUTH AFRICA - Real Wages in 1985 Rands/Month
Returns from education will take years to emerge. Given the need for economic growth to resume as quickly as possible, the skills of the labor force should be upgraded through training. At present, the position is dire. The number of apprentices did not increase in the 1980s. Only about 9,000 were indentured in 1990, of whom 6,700 were whites. While some 280,000 people were trained on public and private courses in 1990, much of this training took a week or less.

A serious upgrading of skills can only come about through the private sector supported by long-term strengthening of the education system. But such training is likely to be geared to the short-term needs of the firm and may be of limited social value. One solution could be through a pact between major employers and the trade unions. Employers would agree to upgrade workers through training, and the unions would agree to limit strikes and other industrial action. Some promising initiatives are already underway along these lines.

Productivity Growth Through Exports

A reorientation of the private sector towards exports should provide a consistent source of aggregate demand and promote growth through greater production efficiency. The economy has been mainly driven by domestic demand and has been increasingly susceptible to problems of demand insufficiency since the early 1970s.

Exports both influence and contribute to higher growth. First, an export-oriented path is associated with increased productivity, as existing factors of production are used more efficiently in response to external competition and to the need to be more cost-efficient. There may also be economies of scale. Second, there may be gains from reallocation from less-efficient to more-efficient sectors. Third, firms are forced to upgrade capital and labor to compete in world markets. Competition through external trade is an important source of the development of skills and helps producers keep abreast of new production techniques. The positive externalities from technological diffusion and the transmission of ideas are important for continued growth. A more internationally comparable set of domestic prices in tradable goods should mitigate efficiency losses from South Africa's oligopolistic production structure.

In the short-run, South Africa's manufacturers may sustain growth in exports; in the medium-to-longer-term, export growth will inevitably mean expanded capacity. This will take place only if the private sector has a clear idea of the direction of policy and faith in the government's commitment. If South Africa wishes to stimulate investment in export activities, the government must articulate its strategy for the external sector, while allowing sufficient time for the private sector to make the necessary adjustments. Such a strategy might include a commitment to export-led growth; a policy package to give exporters free access to inputs used in export manufacturing; offsetting the anti-export bias associated with continued import protection; and a plan for rationalizing tariff schedules and reducing protection. Important steps are being taken in these directions by the recent agreement with the GATT. The system is, however, unchanged at present.

South Africa's most urgent task in international trade is to address the anti-export bias inherent in its policies. Two-thirds of the disadvantages that South African exporters suffer relative to foreign competitors stem from the higher prices they pay for manufac-
tured inputs. The experience of East Asian exporters suggests that trade policies should be biased in favor of exports. At a minimum trade policies should be neutral.

Export neutrality is easier to achieve with totally free trade. In South Africa, it has often been inextricably linked with import liberalization. The two are not synonymous. It is possible to have export neutrality while maintaining protection. To achieve neutrality, there are two separate tasks. First, all exporters must have free access to imported inputs. Second, incentives to export must be brought more in line with incentives to produce for the domestic market. Exporters should be helped to gain access to high-quality inputs at world market prices. This requires some liberalization but not necessarily greatly-reduced protection. To ensure that future investments are directed by the needs of international competitiveness, a credible, time-bound program should be introduced to lower tariffs on protected industries over the medium-term. In reviewing import tariffs, three problems need to be tackled swiftly: unevenness in the duty schedule; an unduly complicated tariff structure; and a highly unstable tariff schedule.

South Africa's average import duty is not high by developing country standards. While a lower average rate would make industry more internationally competitive, the present high unemployment and stagnating economy make such a course undesirable. South Africa needs to make protection transparent and rationalize the import duty schedule -- streamlining the tariff schedule, under which all tariffs would be converted into ad valorem rates.

There is no justification for continuous changes to the tariff schedule. The cost (in uncertainty for the economy and the administrative burden) is large. Business can adapt to bad policies but it cannot adjust to an uncertain policy environment. The schedule could be greatly simplified with similar tariffs for similar goods. Such changes would probably increase equity by reducing evasion and make the system less susceptible to pressure from special interest groups.

There are several ways of achieving free access such as free trade zones, bonded warehouses, duty exemption and drawback schemes. Exporters should be allowed to choose from these alternatives. However, it is desirable that a general duty-drawback system be established for all exporters. South Africa needs a streamlined, automatic, duty-drawback (or rebate) scheme explicitly independent of any suggestion that exporters should first shop for local inputs before importing.

**Job Creation**

The need for more jobs is crucial. Finding work for the skilled should be relatively easy but for unskilled workers unemployment is likely to remain high for some time. It is critical in terms of efficiency and equity that unemployment be reduced quickly. Public works schemes will help. So, too, will encouraging the growth of small-to medium-size firms and a shift to more labor-intensive agriculture.

Recent work by the World Bank suggests that small businesses are constrained by a narrow range of market opportunities and by limited access to finance. Deregulation has already removed the biggest restrictions on market entry. But new market infrastructure closer to central business districts where purchasing power is concentrated is needed. Available and appropriate financial services should be expanded.
Despite its relatively low share in GDP, agriculture is important as a source of future employment. A fundamental change in agricultural policies is needed to remove existing distortions, such as subsidies on rural credit in the commercial farm sector biased against small-scale farmers. A rural restructuring program without expropriation of land from existing owners should transfer a significant share of agricultural land to small-scale black farming. International experience suggests that such a program would be most effective if it relied on the existing land market, but incorporated strong affirmative action by broadly-targeted injections of purchasing power. A shift towards smaller-scale agriculture does not impede agricultural growth.

Reviving Government Investment

The resources needed to redistribute public services adequately are considerable. It will cost around R8 billion to provide sufficient extra classrooms for those children now enrolled and those out of school. The cost of urban renewal will be even greater. In the Witwatersrand area alone, the total cost of providing additional water, sanitation, and electricity could be R6 billion-R10 billion.

The priority is to revive government investment as a percentage of GDP to the levels of the 1970s and to control growth in recurrent spending consistent with fiscal targets. How precisely can this be done? Any future government will decide its own priorities. But in the initial stages much new spending will go to urban infrastructure in deprived areas -- sanitation, water supply, roads, garbage collection, and domestic electrification -- and to the social sectors (new schools and classrooms and local clinics). But the locational distortions introduced under apartheid should not be extended. It is also important that the rural sector is not neglected, otherwise there could be excessive rural-urban migration.

New public investment should not concentrate on inefficient and highly capital-intensive major parastatals. Nor should it be directed to infrastructure in white areas, although maintenance should be spread across all existing infrastructure. Where possible, preference should be given to labor-intensive public works projects. Where the public sector is the contractor, wages of unskilled workers should be paid at informal sector rates -- about one-half of those in the formal sector.

Feasible growth in government investment could result in impressive redistribution if real recurrent expenditure growth is held at about 2 percent annually. Given a private investment revival and the successful implementation of supply-enhancing policies, redistributive public investments could amount to around R14.9 billion per year over 1994-2005 at 1992 prices. This is equivalent to an annual average of about 3.2 percent of GDP.

Prudent Fiscal and Monetary Policies

Within this framework, it will be essential to follow prudent fiscal and monetary policies. Exceeding the limits of a sustainable fiscal position will lead to inflation and balance-of-payments problems. There can be little doubt that private investors will regard high fiscal deficits in the early years of a new government as a negative signal. This will apply very strongly to investors abroad. On monetary policy, which has generally been well-managed, there are two warnings. First, it seems unwise to stimulate the economy through a return to the negative real interest regime that prevailed in 1973-83. That would encourage increased capital-intensity, raise investment-to-output ratios, and put more strain
on the balance of payments. It would do nothing to create jobs. Second, it could be disastrous if a future government monetized the fiscal deficit; this would accelerate inflation. The social consequences of that would be disruptive. The authorities need to also consider the consequences for the real economy of quickly reducing inflation much below its present level.

Even with such a highly redistributive expenditure program, there is room for restraint on growth in recurrent spending. This has been almost entirely driven by growth in wages and expenditures on goods and services. The rise in wages is explained by rapid growth in the number of government employees, while, in the rest of the economy, employment fell slightly over the past 10 years. Administrations in the homelands and elsewhere have been increasingly overstaffed. In 1981-92, the number of employees in central government and provincial administrations grew by about 34 percent; in the self-governing territories it grew by 118 percent.

Importance of Social stability

No economic program in South Africa can succeed unaccompanied by increased social stability. If gains from growth are not perceived by the community at large as being distributed equitably, social unrest will re-emerge, and political and economic stability will be undermined. Higher growth without redistribution cannot work in a future South Africa; for this reason, the redistributive aspects of a future growth process are particularly important. The South African economy has some initial advantages -- spare capacity, excellent infrastructure, and low external debt. There is no reason why, given the right economic environment and policy framework, the economy should not be able to re-establish positive per-capita GDP growth. The sustainability of this will require a commitment by all the major players in the country to implement a coherent and redistributive economic strategy.

5. Simulating Sustainable Growth: Effect of Specific Macro Policies

The policy recommendations outlined here are likely to create a wide series of repercussions in the economy. While “back-of-the-envelope” calculations are often useful when looking at short-term effects, an examination of the behavior of key economic variables for the longer-term requires a more rigorous approach. With this in mind, a macroeconomic model has been constructed capable of simulating future scenarios for the South African economy under different conditions.

A Macro Model for South Africa

The model is based on a set of econometric equations estimated for the years, 1960-92. The aim in constructing this model was to identify the main quantitative relationships that have driven the South African economy over this period, and to then use these to examine the consequences of different policies and changes in exogenous factors that affect the economy. As in most macroeconomic models, the structure is relatively aggregated in that the various sub-sectors of the economy are not dealt with in the greatest possible detail. The model nevertheless predicts all conventional national income values and many more. In total, the model comprises around 300 identities and equations of which 45 econometric equations were estimated using time-series data. The treatment of the product market in the model permits an evaluation of both demand-stimulating and supply-raising measures.
Most macroeconomic models can be classified as either demand-constrained (Keynesian) or supply-constrained (Neoclassical). The present model can switch between these two regimes. The basic approach is that the model decides for each year, whether a demand or a supply constraint is binding upon the economy, and then solves for the various macroeconomic variables accordingly. The model can be used to measure the economic impact of specific measures and policies (a new tax policy, different sizes of public investment programs) or to identify the variables and policies that will be critical if the country is to attain sustainable high growth.

How Can Public Investment Revive the Economy?

The central approach here is to use the model to examine the economic effects of launching hypothetical redistributive public investment programs of different sizes over and above recent public investment levels, and to then judge their sustainability and feasibility. We investigate the maximum sustainable size of a public investment program under three scenarios. In all three, recurrent expenditure growth is assumed below recent levels. Figure 8 illustrates GDP growth under these scenarios.

A set of simulations with the model concentrates on this one major question: "How much public investment can South Africa afford?" The answers vary according to the assumptions made. The central conclusions that emerge are that the affordable level of public investment will be higher (and linked to):

- the greater the recovery in private investment;
- the more success achieved in implementing supply-enhancing policies through faster skills accumulation and export promotion; and
- the more favorable the external environment.

If high levels of private investment re-emerge, and supply-enhancing policies are put in place, there are feasible growth paths for South Africa that are high by past standards (above 5% per annum), sustainable (low inflation, stable fiscal account, low and stable debt-to-GDP ratios) and redistributive. Under these paths, substantial public investment programs are affordable. But if a revival in private investment does not emerge, and there are no supply-enhancing policies, the economy will continue down a recessionary path. In such a case, attempts to introduce new and redistributive public investments will quickly run into fiscal and/or balance-of-payments crises.

In particular, over the period, 1994 - 2001, total cumulated government investment could be as high as R. 22 billion at 1985 prices in the lower growth case, and R. 35 billion if faster growth is achieved through supply-enhancing policies -- average investment levels equivalent to 1.9 percent and 2.7 percent of GDP respectively. These figures compare with the historical low of 1.5 percent of GDP allocated to government investment in 1992. These figures represent additional Government investment, over and above the 1993 level, averaging R1 billion at 1985 prices per year over 1994-2001 in our lowest case scenarios. A substantially higher level of government investment could be accommodated under our best case scenario (an additional R2.3 billion at 1985 prices annually during the 1994-2001 period, and an additional R7.3 billion in 2002-2005).
Reducing the Social Backlog

How much of the social backlog of capital expenditures can be eliminated by the maximum affordable public investment program?

Here one needs to compare the latest estimate of the size of the social backlog with the results of the scenarios. The results indicate that under all three scenarios, an additional R. 12 billion at 1992 prices can be spent during the first 4-years of the new dispensation. South African sources estimate the size of the social investment backlog to amount roughly to R. 46 billion. If this estimate is correct, then about a quarter of the total backlog can be addressed during the first 4 years of the new Government.

Over the following 4 years, 1998-2001, the remainder of the backlog could be cleared under the best-case scenario. However, if the macroeconomic situation is less favorable and closer to that of the lower-case scenario, then the room for maneuver is obviously more restricted, and only about 13 percent of the remaining backlog could be cleared. The lower scenario would thus imply that less than 40 percent of the estimated backlog of capital expenditures would be addressed in the first 8 years of the new administration.

Foreign Finance

How much long-term foreign finance would the economy need? Under the best-case scenario, the foreign financing requirements of
the economy would be modest in the early years of these programs. During 1994-97, the economy requires finance essentially to cover existing debt repayment and increase the level of reserves but can rely on existing current account surpluses. These long-term financing needs then rise over subsequent years as the current account moves into deficit. But given substantial growth in the economy, long-term external financing requirements would never go much over 1 to 2 percent of GDP in any given year before 2001. Under the lower-case scenarios however, the external financing requirements would be much more severe.

**Dangers of Excessive Wage Increases and Fiscal Indiscipline**

Another set of simulations focused on wage issues. While it is tempting to imagine that fast redistribution could be attained by simply encouraging large wage rises for unskilled workers, the evidence here suggests otherwise. A simulation of the effects of a once-and-for-all wage increase of 5 percent above the rate of inflation in 1995 followed by persistent real wage resistance indicated that not only would employment growth be slowed, but that real wages would actually be at a lower level by the turn of the century than in the absence of such an increase. Excessive wage increases are eventually self-defeating. Inevitably, such a high rise in the money wage would stimulate inflation and raise the fiscal deficit by increasing the cost of employing workers in government service.

Fiscal indiscipline, as represented by excessive government expenditure, could have even worse results, particularly, if, as seems likely, this were accompanied by a fall in private investment. Under this scenario, growth in GDP and employment would decline, and the economy would soon face mounting public and foreign debt and faster inflation. Although doubtless motivated by the best of intentions, such excessive expenditures would eventually work to the disadvantage of most of the population.

**6. Concluding Remarks**

The results of the various simulations with the model seem to support the conclusion that a healthy climate for private investment is essential. Without this, sustained growth will not take place. The simulations also seem to support the policy framework outlined -- supply-enhancing policies will have a big impact if the conditions are right. As always, the results are sensitive to the specification of the model and to the assumptions made in the simulations. But it is hoped that these results will assist the debate regarding the policies to be followed. One thing is clear: South Africa could have an attractive future, but the right policy mix is needed to achieve this.
PART II

MAIN REPORT
Chapter I

INTRODUCTION

Background

This paper assembles some of the early results and conclusions of the World Bank’s work program on South Africa\(^1\). Although the paper is mainly concerned with the results of the economic work program, it incorporates input from work in other areas, particularly agriculture, education, industry, trade and the urban sector. Given the complexity of the South African economy, the economic work is passing through its intermediate stages, and there is still much to be accomplished. The program is still in its infancy in work done so far in the financial sector, transport and construction.

In April 1991, the Bank started a small program of study work on the economic issues that South Africa is likely to face after the final abolition of apartheid. The program sought to respond to one overriding question -- What are the policy options for shifting the economy to a higher-growth path which would reduce poverty and address current inequities? As resources were limited, it was decided to concentrate the first year’s work program on macroeconomic policy; employment prospects and related policy implications; industrial policy with special emphasis on employment generation; and public expenditure alternatives. Informal working papers have already been released on the first three. Further papers in the same series were released recently on the foreign trade regime; the small-scale sector; and agriculture.\(^2\)

Two central considerations guide the design of the program. First, that future policy must seek to simultaneously revive economic growth from its existing negative level, and visibly improve the living standards of the disadvantaged majority. A growth revival that fails to achieve visible redistribution is likely to falter under the weight of growing social unrest, while improving the living standards of the poor will become increasingly difficult unless growth is revived. Second, a future policy framework must avoid runaway inflation as, for example, observed in some Latin American countries, together with excessive levels of domestic government debt and national external indebtedness. Fortunately, although the fiscal deficit has risen sharply over the past two years, South African policymakers otherwise start from a reasonable position, as inflation is falling, and the level of external debt is relatively low by international standards.

Main Conclusions

The main argument of the paper is that a revival of private investment is essential if

\(^1\) South Africa is defined (unless otherwise stated) to include the apartheid-era entities of Transkei, Bophutatswana, Venda and Ciskei (TBVC).

the economy is to move on to a sustainable growth path. With a revival in private investment:

- backlogs in the provision of public services can be seriously addressed through increased public expenditure;
- positive levels of per-capita GDP growth can be maintained without incurring serious fiscal or balance-of-payments difficulties;
- supply-enhancing measures, such as, expanding the skills base, encouraging exports and domestic competitiveness, will pay dividends in higher economic growth.

Without a private investment revival, GDP will not grow fast enough, and attempts to expand public investment will quickly run into serious fiscal and balance-of-payments problems. Supply-enhancing measures will also have little effect unless augmented by additional investment.

**Structure of the Paper**

This paper concentrates largely upon the problem of restoring faster growth in the economy. Its focus is on the medium-to-long term, although some consideration is given to issues of short-term economic management. It lays emphasis upon the need to revive the private sector while taking all reasonable measures to maintain social stability. It argues against repeating the mistakes of the past, and suggests the first elements of a growth strategy. Close analysis of the detailed impact of alternative macroeconomic strategies on the distribution of income, is a high priority in the next stage of the work program.

The first step is to isolate the key features of the economy to be taken into account in designing a strategy. Chapter II identifies these as declining growth; faltering productivity; rising unemployment; extreme welfare inequalities; and constraints on policy posed by inflation, the balance of payments and the fiscal position. South Africa is seen here as having an economy of great potential that has been in decline for many years. Chapter III explores the reasons for this -- and concludes that many factors have been at work, most of them driven by past policies. The increased importance of public investment contributed to growing capital intensity and diminished productivity. The incentive structure likewise encouraged capital-intensive investments in the private sector with similar effects. The apartheid system was a powerful influence. Past inequities in access to education and training have left South Africa with a generally unskilled labor force. This, and slow skill accumulation have created an imbalance between human and physical capital accumulation, and thus hampered growth. As the apartheid system broke down there was a tendency for black wages to rise towards white levels: This has reduced employment growth and exacerbated unemployment. Apartheid also distorted residential patterns in urban areas. This may have depressed the productivity of unskilled workers and hampered informal-sector growth.

International trade provides a vital avenue for improved resource allocation and a basis for sustained growth. South Africa has
not taken full advantage of the gains from international specialization in the past, while opportunities for further import substitution seem to be exhausted. Chapter IV argues that the trade protection regime has biased producers away from exports and towards the home market. Exports have thus tended to grow only when domestic demand was low. The efficiency gains from greater export orientation are unlikely to be realized under such circumstances. There is evidence, however, that domestic producers respond favorably to exchange-rate and export incentives. A reduction in anti-export bias through tariff reform and other means would encourage export growth and allow the economy to reap the benefits.

Chapter V sets out and discusses a recommended policy framework for South Africa aimed at restoring growth and rapidly benefiting the disadvantaged. The cornerstones of the strategy are that the private sector must be revived, and social stability restored and maintained. Five policy directions are recommended; raising the skills of the workforce; encouraging exports; creating jobs through rural restructuring and encouraging the development of small businesses; raising government investment and other expenditures directed towards disadvantaged communities; and maintaining sound fiscal and monetary policies. The chapter explains the interrelationships between the various components of the strategy, and describes each in detail.

Chapter VI examines the potential impact of an expansion of public investment on growth, unemployment, inflation and the balance of payments. This is evaluated using an econometric model developed by Bank staff under various scenarios. The broad conclusion is that a revival in private investment will be essential if South Africa is to move on to a sustainable growth path. These scenarios assume that political stability is achieved and that access to international capital markets increases sufficiently.

The analysis of the main volume (Part II) is supported by a series of Annexes (Part III). These set out: the full econometric model with all results fully reported; an analysis of total-factor-productivity growth in the manufacturing sector; the empirical determinants of investment both in aggregate and in manufacturing; a detailed empirical analysis of manufacturing exports and imports; and a more detailed description of the system of trade protection.

Over the next year, the Bank’s program will reinforce its understanding of macroeconomic relationships, develop a clearer understanding of the potential impact of alternative policy scenarios on income distribution, and complement ongoing work on public expenditure with a parallel study on public finance alternatives. The results of that work will be published as stand-alone papers in this series. Taken together the papers should provide a practical guide for policymakers and colleagues.
Some features of South Africa's economic experience are the envy of many other countries -- notably, a rich endowment of minerals that permits an income per-capita consistent with upper middle-income status. This has greatly influenced the structure of the rest of the economy. The monetary, fiscal, and exchange-rate policies have been well-managed. The country has generally excellent infrastructure and well-developed financial and legal systems.

But the country is nonetheless plagued by serious problems. Although it enjoys a per-capita income of around USD2600 per year -- higher than every other country in sub-Saharan Africa except Botswana -- it has been characterized for nearly three decades now by declining economic growth. This has been accompanied by an equally severe fall in the rate of employment expansion and consequently by a serious increase in unemployment. While these problems are more than sufficient in themselves to give rise to great concern, they are greatly compounded by the urgent social and political need to reduce inequalities in income and welfare. The fiscal deficit has recently risen to a record level, there is little room to maneuver on the balance of payments, and there is the threatening possibility of renewed inflation.

Two problems stand out over the short-to-medium term: poor employment performance and gross inequalities in access to public services. The new government will undoubtedly face great pressures to deliver more jobs and improve the quantity and quality of public services received by the majority of the population. Failure in either of these daunting tasks will endanger social stability and make it difficult to address other pressing needs.

Some of South Africa's problems are common to other developing countries -- declining terms of trade, uncertainty about future export prices, and periodic droughts. The direct and indirect effects of the system of apartheid have taken many forms. Among the direct effects one can list: a public sector largely developed to serve the interests of the white minority; a relatively unskilled labor force; an inappropriate agrarian structure; and an inefficient locational structure. The indirect effects include: labor market shocks shown by rising black wages linked to the gradual breakdown of the system; recent industrial unrest; and the effects of international opprobrium as expressed through various trade and financial sanctions.

1. Declining Economic Growth

South Africa's growth record since the mid-1960s has been characterized by a long-term decline in the pace of expansion. The annual average growth rate in real GDP has
declined steadily since 1965 (Table 2.1). In the first half of the 1960s, growth in real GDP approached 6 percent per year, but by the latter half of the 1980s, it had fallen close to 1 percent. The behavior of the trend in real GDP growth can be seen in greater detail by examining the five-year growth average line. The trend in growth peaked in 1965, and, despite temporary resurgences in the early and late 1980s, has declined ever since. Per-capita GDP growth has been negative on average since around 1982, given population growth rate of 2.6 percent per year.

Purchasing power within the economy has also declined. In Table 2.1, purchasing power growth is approximated as growth in Gross Domestic Income (GDI), that is, growth in GDP adjusted for changes in the international buying power of South Africa’s exports measured in imports. As Table 2.1 illustrates, the relationship between growth in GDI and that of GDP has not always been steady. GDI growth increased from 1961 to 1975, while GDP growth fell, given an improvement in South Africa's external terms of trade. Over the 1980s, however, GDI has grown more slowly than GDP as the purchasing power of exports over imports decreased. Private consumption increased in per-capita terms until 1975, but has remained roughly constant since.

There have been significant changes in the composition of GDP. The manufacturing sector is the principal component of GDP by industrial origin, followed by wholesale, retail and trade, and mining. In 1960, the sector constituted 21 percent of GDP; its share steadily rose to about 24 percent in 1970. The contribution of the manufacturing sector remained above 22 percent during the 1970s and 1980s and reached a peak of 26 percent in 1989. Although mining was traditionally the dominant productive sector, its contribution to GDP has declined, from 13 percent in 1960 to

| Table 2.1: Average Annual Growth Rates in Real GDP and other Real Indicators |
|------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| GDP                   | 5.94     | 5.15    | 3.49    | 3.13    | 1.36   | 1.03    |
| GDI                   | 4.62     | 5.81    | 6.39    | 4.02    | 0.03   | 0.27    |
| Private Consumption   | 4.62     | 6.00    | 5.08    | 2.64    | 2.65   | 1.97    |
| Employment            | 3.18     | 2.53    | 2.41    | 1.42    | 0.07   | -0.23   |


Notes: Gross Domestic Income (GDI) -- real GDP adjusted for movements in the external terms of trade. Employment -- wage and salaried employment including domestic servants.
8 percent in 1971. Its contribution rose to the unusually high share of about 22 percent in 1980 given a temporarily favorable gold price, but has fallen to around 10 percent in recent years. The agricultural sector constituted 10-12 percent of GDP in early to mid-1960s. However, its contribution has continuously dwindled from 9 percent in 1969 to less than 5 percent in 1991. The contribution of general government has risen from 9 percent of GDP in the 1960s to about 15 percent in 1991.

The private sector's contribution to GDP has been dominant, amounting to over 70 percent throughout. The share of the public sector¹ has fluctuated around 20 and 30 percent, while the parastatal share has increased from about 12 percent in the 1960s to about 18 percent in 1986. After 1986, the share of parastatals dropped to about 14 percent.² The shares of these institutional sectors in gross fixed investment have also moved noticeably over the years.

The decline in GDP growth was mirrored in the manufacturing sector. The evolution of manufacturing reflects the import-substitution strategy followed during the sixties and seventies and is typical of countries following such a process. Production progressed from non-durable consumer goods, to durable consumer goods, and then to more highly processed and sophisticated intermediate products.

¹ Public sector is defined as the sum of public authorities (general government and public business enterprises) and public corporations.

² This was partly caused by the privatization of two parastatals, Iscor and Sasol, during this period. The exact effect of this on the capital stock estimates is unknown.
and capital goods. From 1946 to 1970, manufacturing grew at an annual average rate of 6.9 percent and was the leading sector of growth in the economy as a whole, which grew at 4.9 percent. Between 1970 and 1981, while manufacturing growth slowed, it still grew faster than other sectors of the economy. Since 1981, however, the sector has stagnated; its output, employment and rate of capital accumulation have all been low in comparison to historic levels, and between 1983 and 1988 the capital stock actually declined. The decline in the sector (about 2.6 percent annually) between 1981 and 1986 was a major reason for the overall decline in the South African economy over the same period. Manufacturing growth remains anemic (at 2.2 percent since 1986) despite a recovery in investment after 1986.

Growth in South Africa has become increasingly volatile as shown by the growing amplitude of fluctuations in the annual GDP growth rates shown in Figure 2.1. This seems to have been more related to internal and external shocks than to movement along a regular business cycle. Political developments have undoubtedly had a growing influence here. The economic fallout from the Sharpeville massacre of 1960 appears to have had little effect, as GDP growth went on rising until 1965. However, growth plunged after the Soweto uprisings of 1976 and following the imposition of financial sanctions in 1985. Despite a recovery in growth between 1986 and 1988, increased political uncertainty and growing social unrest have contributed to the subsequent decline. The gold-price booms of 1974-75 and 1979-80 assisted a demand-driven resurgence in GDP growth, despite simultaneous increases in the oil price.

Although the economy enjoyed a temporary recovery from the shock of financial sanctions, it entered a deepening recession in 1989 that continued through 1992. This has further depressed GDP growth (-0.6 percent in terms of real GDP in 1990 and 1991, and -2.1 percent in 1992). While GDP growth during 1992 was adversely affected by an unusually severe drought, numerous indicators strongly suggest that the economy was driven by falling aggregate demand.

Consider these indicators. First, private investment dropped absolutely in real terms over every year between 1989 and 1992. As a percentage of GDP, private investment fell from 13.3 percent in 1988 to 11.4 percent in 1992. Second, employment in the non-agricultural sectors fell by about 4.9 percent between mid-1989 and December, 1992. The last absolute decline in this series coincided with the sanctions shock of 1985. This led to a sharp rise in unemployment. Although there is no direct short-run indicator of unemployment in South Africa, the number of persons registered as unemployed at labor exchanges rose by more than three times between 1989 and December, 1992. Third, the Central Statistical Services’ (CSS) measure of capacity utilization in the manufacturing sector shows a fall of 7.9 percentage points during 1989-92. Fourth, all three composite business cycle indicators as calculated by the South African Reserve Bank (SARB) show comparable declines. Fifth, private sector confidence as estimated by the South African Chamber of Business (SACOB) and the Bureau of Economic Research was severely eroded over recent years.
There are now some signs that the economy may be emerging from the recession. SACOB's monthly business index rose sharply during the second half of 1993, and reached its highest level since April, 1989. Business confidence seems to have been boosted by higher exports and the lifting of most remaining sanctions. So far, however, there is only weak evidence of renewed growth. Although real GDP grew at about 1 percent during 1993, much of this expansion arose from a rebound in agriculture following improved rainfall. Production increases in other sectors are so far evident only in the third quarter. Private investment continued to decline during the first three quarters of 1993, although an imminent renewal in foreign investment is hoped for.

South Africa has thus experienced a declining growth rate recently further depressed by an extensive recession. While the economy has gone through temporary recessions in the past, the present one has lasted longer and may well be more severe than its predecessors.

2. Faltering Productivity Growth

South Africa's growth performance cannot be fully explained in terms of reduced investment. The chronic decline in growth was accompanied for a number of years by a high and increasing ratio of investment to GDP. South Africa was investing a substantial share of its income but receiving progressively less in economic growth. Growth in total factor productivity (TFP) in the economy as a whole declined markedly in the early 1970s, and became negative during the 1970s and early 1980s. Other disquieting productivity trends occurred in key sectors. The increasingly serious obstacles to growth in South Africa will have to be removed if growth is to be renewed.

Productivity growth has been unimpressive. Over the past three decades (Table 2.2), total factor productivity has grown on average at only 0.4 percent per year. Although TFP growth was reasonably rapid during the 1960s, it declined during the 1970s and early 1980s, and recovered only modestly during 1986-91. Overall, there has been no improvement in TFP since 1970; this picture becomes even grimmer if government services are excluded. These developments are reflected in the performance of other key sectors.

In agriculture, a combination of capital intensity and a highly regulated and protected environment for white agriculture resulted in high levels of investment, and modest but significant levels of growth in technical efficiency. However, the technologies adopted seem inappropriate to the South African context (capital-intensive in the face of a growing labor surplus), and have proved financially unsustainable since the early 1970s. While South African yields per hectare exceed the average for the African region by about 50 percent, they compare unfavorably with world averages. Over the last 20 years, physical yields of major domestic crops have increased only moderately, and maize yields (44 percent of crop area) have been virtually stagnant since 1970. The sector is highly capital-intensive -- the capital/output ratio in many parts of the agricultural sector has been as high as three

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3 Total factor productivity is defined as real GDP divided by an index of capital stock and employment combined.
times that of manufacturing, and the total factor productivity of South Africa's main crops increased only modestly between 1960 and 1985. These features are reflected in the movement of the major aggregates. Up to the mid-1960s, output and investment moved at a similar rate with the capital stock increasing gradually with mechanization. After the mid-1960s, the investment rate increased significantly but the greater capital intensity did not translate into higher output. TFP growth resumed during the 1970s given a more stable input level, and the level of investment dropped dramatically during the 1980s with consequently higher TFP growth during the second half of the decade.

During the 1960s, total factor productivity in mining increased steadily, reflecting relatively stable technology and improved efficiency of production methods. This trend in productivity slowed in the seventies. Despite this, the rate of growth of the capital stock increased rapidly over the same period. Between 1970 and 1980, mining's capital stock grew at the average annual rate of 6.6 percent, while output declined at 1 percent each year. Consequently, productivity fell precipitously after the early seventies with the output-capital ratio and TFP declining at 7.6 and 5.8 percent per year respectively. Similar trends continued during the 1980s.

The two salient features of the South African manufacturing sector over the last two decades are: low (and occasionally negative) total factor productivity growth, and capital stock growth of over 4 percent per year combined with much lower employment and output growth. Table 2.2 shows two distinct periods in TFP growth. The first period (1961-70) shows a rapid increase in TFP. There was a rapid increase in labor productivity without any change in the productivity of capital. In the second period (1971-91) however, capital productivity declined significantly and labor productivity slowed, thus leading to no TFP gain over almost two decades. Between 1972 and 1983, there is a significant decrease in capital productivity as a result of large "strategic"

| Table 2.2: Growth in Total Factor Productivity  
<table>
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<th>(Annual Average Percentage Rates)</th>
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<tbody>
<tr>
<td>GDP</td>
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<tr>
<td>GDP (Non-Government)</td>
</tr>
<tr>
<td>Agriculture</td>
</tr>
<tr>
<td>Mining</td>
</tr>
<tr>
<td>Manufacturing</td>
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</tbody>
</table>

Source: World Bank Staff Estimates
investments in chemicals.\(^4\) After 1983, the economy entered a major recession with a very low rate of growth of output, absolute declines in the level of capital stock, and positive TFP growth.\(^5\) While TFP growth in manufacturing is not particularly low by the standards of most developing countries (see Annex C), it is well below that achieved by the high performers.

Detailed analysis shows the productivity change within 27 sub-sectors in manufacturing (3-digit ISIC level). The lack of productivity gains is broad-based. Twenty sectors had productivity growth less than two percent -- not particularly high compared to other countries. More significantly, eleven sectors had negative TFP growth. The textiles and clothing sectors (both light manufacturing) and basic metal industries achieved better than average productivity growth. Industrial chemicals had the highest negative TFP growth.

3. Rising Unemployment

South Africa faces a growing employment crisis. In the early 1960s, over 80 percent of new labor market entrants were absorbed into wage employment. In recent years, this has fallen below 10 percent. This was the result of ever-slower employment growth in the modern sector combined with a relatively constant growth rate in labor supply. Despite substantial growth in the informal sector, the unemployment rate has rocketed to over 20 percent of the total labor force, and has reached even higher levels among Africans. Unemployment rates of this magnitude represent a considerable waste of South Africa’s resources, and are a major source of social unrest.

Employment growth has deteriorated consistently since 1970. The annual average growth rates in employment show a close relationship between employment growth and growth in the economy. As shown in Table 2.3, total employment growth peaked among all racial groups in the 1960s, and has declined since. The period since 1985 has been particularly been partially offset by substantial growth in employment in government services. Had there been no growth in government employment, total employment growth would have been negative over the period, 1986-90.

There is a startling imbalance between the employment growth rates given in Table 2.3, and existing estimates of labor supply growth\(^6\). Estimates of labor force growth taken from Sadie (1991) indicate that the African labor force growth increased from about 2.5 percent per year in the early 1960s to about 2.8 percent a year in the 1980s. Annual labor force growth among Asians and Coloreds declined from 2.8 percent in the 1960s to 2.6

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\(^4\) An earlier study (Levy, 1992) showed that the increase in capital-intensity in manufacturing over time could be attributed in great part to the steel and chemicals sub-sectors.

\(^5\) The increase in capital productivity during the post-1983 period should be treated with caution. During this period, investments are lower than the depreciation allowances made on statistical basis. It is quite likely that machines assumed to be scrapped are still operating and contributing to output. This is consistent with anecdotal evidence of very old machinery still operating in a number of subsectors.

\(^6\) Labor force growth estimates are amongst the most controversial statistics produced in South Africa. A number of different and inconsistent estimates exist for individual time periods, Meth (1989).
Table 2.3: Average Annual Percentage Employment Growth Rates

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<tbody>
<tr>
<td>White</td>
<td>1.88</td>
<td>2.83</td>
<td>1.98</td>
<td>1.03</td>
<td>0.06</td>
</tr>
<tr>
<td>Colored</td>
<td>2.56</td>
<td>3.68</td>
<td>2.50</td>
<td>0.97</td>
<td>0.79</td>
</tr>
<tr>
<td>Asian</td>
<td>3.38</td>
<td>5.11</td>
<td>3.56</td>
<td>1.19</td>
<td>1.71</td>
</tr>
<tr>
<td>African</td>
<td>2.03</td>
<td>2.66</td>
<td>1.72</td>
<td>0.81</td>
<td>-0.38</td>
</tr>
<tr>
<td>Total</td>
<td>2.07</td>
<td>2.86</td>
<td>1.91</td>
<td>0.89</td>
<td>0.00</td>
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Of Which
Gov. Serv.

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</thead>
<tbody>
<tr>
<td>White</td>
<td>3.29</td>
<td>3.79</td>
<td>2.90</td>
<td>1.70</td>
<td>0.89</td>
</tr>
<tr>
<td>Colored</td>
<td>4.68</td>
<td>5.92</td>
<td>5.83</td>
<td>2.75</td>
<td>3.63</td>
</tr>
<tr>
<td>Asian</td>
<td>1.90</td>
<td>6.05</td>
<td>5.73</td>
<td>5.46</td>
<td>3.94</td>
</tr>
<tr>
<td>African</td>
<td>6.87</td>
<td>2.92</td>
<td>5.25</td>
<td>3.41</td>
<td>3.54</td>
</tr>
<tr>
<td>Total</td>
<td>5.14</td>
<td>3.57</td>
<td>4.49</td>
<td>2.84</td>
<td>2.80</td>
</tr>
</tbody>
</table>


percent in the 1980s, while white labor force growth declined from 2.8 percent to about 1.6 percent over the same two periods, given less net immigration. The imbalances between labor supply and demand, expressed as proportions of labor supply not engaged in wage employment, are given in Table 2.4 for selected years. These proportions are not estimates of unemployment rates. Formal self-employment, unmeasured formal wage employment, and informal sector employment are implicitly included. These estimates, nevertheless, show a huge rise in the proportion of the African labor force not engaged in measured wage employment between 1970 and 1990. There is also a noticeable jump in the "not-wage-employed" ratio among whites in the 1980s, particularly after 1985. This ratio varies less among Asians/Coloreds than among Africans. Among Africans at least, these estimates indicate a sharp rise in excess labor supply during the 1980s.

This illustrates a stark contrast between the degree of labor market imbalance between Africans and whites. Africans have been an outsider group in excess supply providing pre-dominantly unskilled labor to the formal wage economy. During the 1960s when employment growth was at its peak, the proportionate level of excess supply among Africans remained roughly constant. It has increased rapidly since then given high growth in labor supply and ever-slower employment growth. Whites have been the insider group supplying mostly skilled labor with the patronage of the apartheid regime. The "not-wage-employed" ratio for whites remained virtually static over 1960-85. There is strong reason to believe that this corresponds with a maintenance of near full employment. Census estimates of white unem-
Employment over the same period do not suggest marked change in the white unemployment rate. In the 1970s, strident complaints were heard from employers to the effect that job reservations were worsening a shortage of skilled labor. White preference within the civil service and major parastatals was also used as an instrument to depress white unemployment. Since 1988, however, for the first time in many years South Africa has an unemployment problem among its white population.

The "not-wage-employed" proportions in Table 2.3 are much higher than measured unemployment rates because workers also participate in the agricultural subsistence sector and the informal sector. The agricultural subsistence sector is relatively small in South Africa given legally-empowered land acquisition by whites and the limited agricultural potential of much of the homelands. The 1985 Population Census in combination with similar censuses for TBVC indicate that this sector accounts for only around 7 percent of the black labor force. The main missing link is thus the informal sector. For present purposes, the informal sector is defined as unmeasured economic activities. The CSS estimated that in 1989, such unmeasured activities contributed a further 8 percent to GDP and that 19.9 percent of the black labor force were involved in the informal sector. Of these, 12.3 percent were involved on full-time. A particularly striking development in the informal sector has been the growth in black taxi services following deregulation. It has been estimated that employment in this sector was equal to 60 percent of that in the gold mining industry\(^7\) by the end of the 1980s.

At least 50 percent of the black labor force is without wage employment. The black unemployment rate is of the order of 25 percent while the remainder is active in the informal and rural subsistence sectors. Incomes earned in the informal sector are lower than formal sector wages, and the CSS\(^8\) estimates that average income from informal sector activities is about 37 percent of the formal sector wage.

4. Wide Inequality in Income and Access to Public Services

Income Distribution and Poverty

There is little doubt that apartheid policies intensified inequality in South Africa beyond the level expected in a country at its level of development. Although South Africa is classified as an upper-middle-income country, most of its national income accrues to the white minority. There is a sharp divergence in per-capita income across racial groups with whites receiving personal incomes per capita of about 9.5 times those of Africans, 4.5 times those of Coloreds and 3.0 times those of Asians. While social indicators for the white population such as infant mortality and life expectancy at birth are in the range observed in developed countries, those for the African majority are broadly comparable with those of poorer surrounding countries. These extreme contrasts tend to confirm the view that there are really two South Africans -- a First-World society for whites and a Third-World society for blacks.

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\(^7\) See, for example, Khosa (1990).

South Africa - Economic Performance and Policies

Table 2.4: Estimated Proportions of Labor Force Not in Wage Employment

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</thead>
<tbody>
<tr>
<td>Africans</td>
<td>0.28</td>
<td>0.27</td>
<td>0.37</td>
<td>0.43</td>
<td>0.55</td>
</tr>
<tr>
<td>Asians/Coloreds</td>
<td>0.29</td>
<td>0.21</td>
<td>0.18</td>
<td>0.29</td>
<td>0.34</td>
</tr>
<tr>
<td>Whites</td>
<td>0.15</td>
<td>0.15</td>
<td>0.16</td>
<td>0.18</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Sources: Sadie (1991) and World Bank staff estimates.

In any country, extreme inequality in the welfare of its citizens, whether defined in income, wealth, access to facilities, or some combination of the three, constitutes a threat to stability. Coexisting extremes of poverty and wealth tend to promote social discontent. Since inequality has been exacerbated by racially-based policies, a non-racially-based government will face immediate pressure to redress the balance, and is very likely to give redistribution unusual emphasis within its policy framework. Unrealistic expectations regarding the speed and consequences of such redistribution are likely to be raised.

South Africa has one of the most inequalitarian income distributions in the world. The Gini coefficient\(^9\), as estimated from household-based personal income data sources, was 0.68 in 1975 and 0.69 in 1980\(^{10}\). While international comparisons are fraught with danger of non-comparability, these values are extremely high by international standards. For example, World Bank estimates of the Gini coefficient typically vary between 0.35 and 0.45 for developed countries and 0.45 and 0.63 for upper-middle income countries (Brazil being a major outlier here). The conclusion that South Africa is an outlier in unevenness of income distribution is supported even if other inequality measures are used.

While this is partly the result of wide income differentials between racial groups, there is also pronounced income inequality within the races. This is particularly striking when one considers the huge differences in income per capita between Africans living in different parts of the country. It has been estimated that in 1975\(^{11}\), African income per capita in the four large metropolitan areas was 2.2 times that of the average for Africans in the self-governing territories and TBVC states combined, and 3 times that of Africans in the rural areas of the rest of South Africa. These aggregate figures tend to conceal the extent of the true variation. For example, the Bureau of

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\(^{9}\) The Gini coefficient is a commonly-used measure of inequality derived from the disparities between proportions of income received by households or individuals within narrowly-defined income bands and the corresponding proportions that such groups constitute within the total population. In a society in which all individuals/households receive identical incomes -- perfect equality -- the Gini equals 0. In a society in which a single individual/household receives everything -- perfect inequality -- the Gini equals 1.

\(^{10}\) See, for example, McGrath (1989) and Mohr (1988).

\(^{11}\) See Wilson and Ramphele (1989).
Table 2.5: Percentage Shares of Personal Income and Employee Remuneration by Race and Ratios of Per Capita Income

<table>
<thead>
<tr>
<th></th>
<th>Africans</th>
<th>Asians</th>
<th>Coloreds</th>
<th>Whites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Income</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>22.4</td>
<td>2.0</td>
<td>5.5</td>
<td>70.1</td>
</tr>
<tr>
<td>1970</td>
<td>22.3</td>
<td>2.4</td>
<td>6.3</td>
<td>69.0</td>
</tr>
<tr>
<td>1975</td>
<td>25.6</td>
<td>2.8</td>
<td>7.2</td>
<td>64.4</td>
</tr>
<tr>
<td>1980</td>
<td>28.3</td>
<td>3.2</td>
<td>7.5</td>
<td>61.0</td>
</tr>
<tr>
<td>1987</td>
<td>31.5</td>
<td>3.6</td>
<td>7.9</td>
<td>57.0</td>
</tr>
<tr>
<td><strong>Employee Remuneration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>31.6</td>
<td>2.7</td>
<td>8.8</td>
<td>56.9</td>
</tr>
<tr>
<td>1980</td>
<td>35.6</td>
<td>3.0</td>
<td>8.4</td>
<td>53.0</td>
</tr>
<tr>
<td>1987</td>
<td>38.0</td>
<td>2.7</td>
<td>7.6</td>
<td>51.7</td>
</tr>
<tr>
<td>1992</td>
<td>38.5</td>
<td>3.4</td>
<td>8.4</td>
<td>49.7</td>
</tr>
<tr>
<td><strong>Ratios of Per-Capita Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>1.0</td>
<td>2.1</td>
<td>1.9</td>
<td>12.3</td>
</tr>
<tr>
<td>1970</td>
<td>1.0</td>
<td>2.6</td>
<td>2.1</td>
<td>12.8</td>
</tr>
<tr>
<td>1975</td>
<td>1.0</td>
<td>2.8</td>
<td>2.1</td>
<td>10.9</td>
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<tr>
<td>1980</td>
<td>1.0</td>
<td>2.9</td>
<td>2.1</td>
<td>10.0</td>
</tr>
<tr>
<td>1987</td>
<td>1.0</td>
<td>3.2</td>
<td>2.1</td>
<td>9.5</td>
</tr>
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</table>


Market Research has estimated that in 1985, African per-capita income in Transvaal -- the highest per-capita-income province/state -- was 6.3 times that of the poorest region, Transkei. The dispersion of per-capita incomes across South Africa clearly reflects the distorting effects of apartheid policies; the distribution of white incomes by geographical area is much less uneven than those of other racial groups.

The incidence of absolute poverty is concentrated heavily among the African population. For South Africa as a whole, it has been estimated by the Bureau of Market Research that 44.8 percent of the population received incomes below the poverty line in 1989. Among whites, the corresponding proportion was 1.6 percent, among Africans, 52.7 percent were below the line. Asians and Coloreds presented an intermediate picture with poverty rates of 10.7 and 28.1 percent respectively. Even among Africans, poverty is

12 Bureau of Market Research (1989), Table 2.13.
South Africa ranks among the top four or five countries in the world in per-capita expenditure on infrastructure. Yet, taken as a whole, the urban areas have worse facilities on average than those in other developing countries at similar levels of per-capita income. This poor distributional performance is evident in such basic indicators as extent of squatting, lack of electricity, poor access to water supply and inadequate sanitation facilities. In the PWV urban area -- the strongest economic region in sub-Saharan Africa -- nearly 70 percent of African households have no direct access to water, and about 50 percent live in structures built of impermanent materials.

The bipolar nature of South Africa is evident in the cities where, in addition to income disparities, differential access to housing endowments, urban services and an effective role in decisions on resource deployment, manifests itself across racial groups. For example, annual per capita expenditure on principal types of residential infrastructure for white areas in the PWV is about US$550 as compared to cities such as Stockholm (US$225), Munich (US$270), and Melbourne (US$340). But over half the black community in urban areas live in informal settlements, and indices of access to basic infrastructure services and per person availability of residential living space for these households are low by African standards.

There are severe difficulties within the social sectors and in the provision of social welfare. The education system has problems linked to policies of institutionalized development. Although education is compulsory for white children, it is not for African children; 25 percent of the latter are not in school. It is common to find 80 to 100
children in a classroom designed for 40. The quality of basic education for African children is deplorable -- teachers are poorly trained, schools are badly managed, and basic instructional facilities and materials are in short supply. The combination of these factors has produced a situation in which little learning can take place. The generally poor examination results of black students testify to this -- in 1991, only 11 percent of those who sat for Standard 10 examinations obtained a matriculation exemption as compared to a success rate of over 70 percent among white and Asian students. Although many white school children in South Africa receive private tuition, public expenditure per pupil in 1990 was over four times higher for whites than for Africans.

The health sector seems driven by a preference for a western-style, capital-intensive curative approach, and most public health expenditure is directed towards curative, hospital-centered health services. Only 2 percent of public health spending goes to local government -- the agencies that provide most primary health care. Health spending is less skewed than that of education; per-capita expenditure on Africans is about one half of that on the other population groups.

The share of government expenditure allocated to social and welfare services remained relatively constant throughout the 1980s. The government has tried to address some problems by increasing the share of these expenditures from 37.7 percent in 1989/90 to a projected 44 percent in 1993/94. The effects of these additional efforts on relevant social indicators for the black population cannot yet be properly assessed.

5. Macroeconomic Constraints

The authorities in South Africa cannot direct their attentions solely to promoting redistributive growth; they must try to stabilize the economy. This section reviews South African experience in three policy areas -- the control of inflation, the stabilization of the external balance of payments and control of the fiscal deficit.

Control of Inflation

For many years, South Africa's experience with inflation was not very different from that observed in many other countries. Before 1968, a fixed exchange rate was maintained with respect to the U.S dollar, and although the exchange rate did move around during the subsequent years through 1974, such movements were relatively minor. Over 1960-74, the price level in South Africa moved in a similar fashion with that of the industrialized countries. This meant that the inflation rate, as shown in Figure 2.2 as the annual rate of increase in the Consumer Price Index (CPI), rose from about 2 percent in the early 1960s to about 5 percent by the end of the decade (as in much of the rest of the world), but jumped to around 12 percent following the first oil price shock in 1973.

Since 1975, however, inflation has been consistently higher than in the developed countries. Throughout the period, 1981-1991, inflation oscillated around the 15 percent mark, while inflation in the West varied around an average of about 3 percent. This persistent gap in inflation rates has been supported by a progressive depreciation of the rand against the major convertible currencies. This kept the
real effective rate of exchange reasonably constant over the period, 1975-84. Very sharp deprecations of the rand in 1984 and 1985 then pushed the real rate substantially below its historical level, and it has appreciated only very mildly since.

Movements in inflation cannot be attributed to deliberate expansionary policies by the monetary authorities. The fiscal deficit in South Africa is entirely debt-financed, and, contrary to the practice in many other developing countries, is not monetized. Indeed, the Reserve Bank has over recent years been willing to raise real interest rates, and has stressed the need to reduce inflation. South African monetary policy accommodates changes in the demand for money by allowing the banking system unlimited "overdraft" facilities. In this system, the interest rate is the main instrument of monetary control and is set according to money supply targets. Money supply is not directly controlled but automatically adjusts to meet money demand.

As in other countries with a substantial share of primary production, there can be substantial differences in measured rates of inflation according to whether the CPI or a measure of producers' prices such as the GDP deflator is taken as the price index. As Figure 2.2 illustrates, although the broad trend in both inflation measures has been similar, inflation as measured by the GDP deflator has fluctuated much more widely. The main reason for such discrepancies lies in the gold price booms of 1973-74 and 1979-80, which raised producer prices but not consumer prices. Other variables that differentially affect the two series are the real effective rate of exchange and the non-gold terms of trade.\textsuperscript{13}

Only over the past year has this picture of a relatively constant inflation rate finally been broken. Inflation in 1992 was down to 13.9 percent, despite a rapid increase in food prices. However, inflation in food prices is coming to an end, following a freeze in these prices by major retailers in September 1992, and inflation is likely to be around the 10 percent mark in 1993. This development is due mainly to the depressant effects of the deepening recession and to the mild appreciation of the real effective exchange rate. These conclusions are supported by the results of the econometric model described in Annex A. Producer prices have tended to rise less sharply in times of recession, while movements in international prices have been important in the inflationary process. During a recession such as the current one, the rate of increase in wages negotiated between employers and employees tends to decline, and employers set less ambitious price markups on unit production costs. The current recession has thus reduced pressure on producer prices and on domestic inflation in general. In addition, the

\textsuperscript{13} The results suggest that the production basket contains proportionately more non-tradable goods and less exports (other than gold). The relationship between the two series may be summarized by this regression equation fitted in logarithmic form and adjusted for first-order autocorrelation for the period 1960 to 1991.

\[
\log(P/CP) = -0.01 + 0.06 \log(RER) + 0.19 \log(GTT) - 0.06 \log(TT),
\]

\(\text{(2.67)}\)

\(\text{(11.42)}\)

\(\text{(1.55)}\)

\(\text{DW} = 1.69, \text{ } R^2 = 0.98, \text{ and } t \text{ statistics are given in parentheses.}

P/CP is the ratio of the GDP deflator to the CPI, LRER is the log of the real effective exchange rate, LGTT is the log of the ratio of the gold price to that of imports, and LTT is the log of the terms of trade index (excluding gold).
appreciation in real exchange rate has reduced the scope for inflation imported from abroad.

Many developing countries, and particularly those in Latin America, would be glad to maintain a steady inflation rate of 15 percent a year. This is, however, a controversial view within South Africa. Until a year ago, expectations regarding inflation had settled down to something close to the actual level, so that the uncertainties governing price and wage setting had largely been eliminated, while interest rates had been set at reasonably constant real levels over recent years. It is generally agreed that any significant upward movement in the inflation rate would be very destabilizing, and would exacerbate social discontent.

**Severely Constrained Balance of Payments**

To put South Africa's balance-of-payments position into an appropriate perspective, it is essential to distinguish between the situation that prevailed before 1985 and developments since then. As Figure 2.3 shows, South Africa incurred significant current account deficits taken as a percentage of its GDP through most of 1960-84. In general, these deficits were sustainable, partly because periods of deficit were to offset by periods of surplus, and partly because finance was available from foreign sources (with the exception of a period in the late 1970s).

Following exceptionally rapid productivity growth that permitted the maintenance of current account surpluses in the early 1960s, the economy remained in deficit in every year from 1964 through 1976. The aftermath of the
Soweto riots in 1976 was a temporary turning point, however, with large outflows of capital, while foreign sources of capital dried up. In response, the authorities imposed restrictive monetary and fiscal policies which led to a real decline in investment and consumption throughout 1977-79.

Consequently, the economy moved into a substantial current account surplus over these years, more than compensating for net outflows through the capital account. The turning point came in 1979 with the dramatic rise in the gold price that enabled a return to a current account surplus, and, through its positive impact on investor confidence, reopened the door to the world capital market. By 1981, the current account was back in deficit and continued so through 1984, by which time the total foreign debt of South Africa had accumulated to about 33.4 percent of its GDP.

The imposition of financial sanctions in 1985, has been a decisive turning point from a balance-of-payments perspective. Financial sanctions had two major implications: first, they effectively sealed off South Africa from many opportunities to borrow from abroad, and second, under the three Interim Debt Arrangements, it was agreed that existing debt would be rescheduled, and then repaid according to a clearly-defined timetable. As a further measure, imbalances in the inflow and outflow of foreign investment, both direct and in securities, were removed through reintroducing the financial rand.

Under this mechanism, foreign disinvestment (in the case of residents this requires the approval of the Reserve Bank) and investment are made to balance, the level of the financial rand being determined by supply and demand at a rate normally well below that of the commercial rand. The net result of these developments in 1985 was that, as in the late 1970s, the capital account moved into deficit -- a situation that has since remained unchanged.

The results of deliberate policy initiatives in the ensuing adjustment remain unclear. However, following substantial falls in both private and parastatal investment, the current account moved into substantial surplus from 1985. Despite this surplus, the value of the rand plunged, and consequently, foreign debt rose further to about 43 percent of GDP. The relative size of the surplus fell during the temporary recovery of 1987-88, but increased again during the present recession. The external debt position has, however, improved considerably over recent years given a consistent current account surplus and a reasonably stable real exchange rate. As a ratio to GDP, foreign debt has fallen over every year since 1985, and stood at 15.1 percent at end-1992 (roughly USD17.3 billion). It seems reasonable to suppose that the foreign debt ratio must now be in the neighborhood of 14 percent.

The authorities have also had to resolve a dilemma regarding exchange rate policy. This arises because the world price of minerals such as gold may move in a different fashion additional inducement to foreign investment. The margin between the two exchange rates has fluctuated widely, and is regarded as the measure of foreign perceptions of the risk incurred in investing in South Africa. At end-October, 1993, the differential between the two rates was around 21 percent.
from world prices in general. For example, while keeping the real exchange rate at a constant level will give much-wanted stability to the exporters of manufacturing goods, it will possibly allow substantial variation in the rand prices received by mineral exporters. Similarly, if the nominal exchange rate were adjusted to maintain stable rand prices for minerals, this would probably imply substantial variation in the real exchange rate with consequent increased risk for manufacturers. This problem was less apparent before 1978, as the commercial rand was usually pegged to the British pound or the US dollar. However, between 1978 and 1983, the peg to the dollar was adjusted with greater frequency, and since then, a more market-determined rate has prevailed, although the Reserve Bank has intervened in the foreign-exchange market when it deemed this necessary. There is little doubt that, given the importance of the mining sector in employment and foreign-exchange earnings, exchange-rate policy has shown some concern for the sector. For example, during the gold-price boom, the authorities intervened to prevent further appreciation of the rand, while following declines in the gold price, they have allowed the rand to substantially depreciate. The real effective exchange rate has thus moved procyclically with the price of gold.

Balance-of-payments problems have greatly constrained the economy over recent years. In the middle of 1988, for example, the current account started to slip into deficit following a moderate growth revival. To protect the foreign exchange reserves and to dampen inflationary tendencies that would arise from additional depreciation of the rand, the authorities were forced to raise interest rates and impose new import duties. This had the
effect of curbing growth and pushing the econ-
omy back into recession. Although gross for-

eign exchange reserves stood at two months of

imports at the end of the second quarter of
1992, this position would rapidly deteriorate
under renewed balance of payments pressure.

Under these circumstances, where a developing
country such as South Africa is forced to gen-

erate ongoing current account surpluses, it is
difficult to envisage a stable growth process
emerging.

There are, however, two hopes in this
situation. First, if a political settlement is

reached, and social and political instability
diminishes, this should go some way towards
easing South Africa's external capital

constraint. Although conditions in world

financial markets are not at their most

encouraging, a political settlement would have

the additional benefit of opening access to

financial support from both bilaterals and the

major financial multilaterals such as the IMF

and the World Bank. Second, South Africa has

the advantage of a low external debt-to-GDP

ratio. This means that, given foreign finance,
a path of both higher growth and redistribution
will be less vulnerable to external constraints.

Such a path could not, of course, be one in
which net foreign borrowing was needed
indefinitely, but rather one in which such
borrowing would be required only until
sufficient additional domestic savings were
generated to make further net foreign
borrowing unnecessary.

A Rising Fiscal Deficit

Until quite recently, the size of the
fiscal deficit was not a serious problem. A
high deficit usually leads to some mixture of

balance-of-payments problems and inflation.

For example, some Latin American and Sub-
Saharan African governments, in attempting to
create growth and redistribution through large
public spending programs in the social sectors
and through subsidies to parastatals, incurred
unsustainable fiscal deficits with disastrous
economic results. In the past, the South
African authorities managed to avoid excessive
fiscal deficits and public debt levels, although
the deficit has fluctuated over the years as a
proportion of GDP. Recently, however, the
situation has changed, and the fiscal deficit has
grown rapidly over 1991 and 1992. The
budget deficit for FY 1992/93 \(^{15}\) reached a
record level of 8.6 percent of GDP, the
primary reason being significantly lower
revenue collections than expected and high
outlays for drought relief. Total government
debt has risen in the face of these increased
deficits from 38.2 percent at end-1990 to 45
percent at end-1992.

In past years, fluctuations in the central
government budget deficit have been reflected
in the accounts for the deficit for consolidated
general government and the Public Sector
Borrowing Requirement (PSBR) \(^{16}\). The
borrowing requirements of public enterprises
and corporations have declined in recent years.
This factor was important in causing a decline
in the PSBR in the late 1980s, for example,
along with cutbacks in capital spending and
other rationalization programs within the public
sector. The GDP ratio for the PSBR reached
a low of 1.5 percent in FY 1989/90, after
which it increased to about 10 percent in FY

\(^{15}\) The financial year is, April 1st to March 31st.

\(^{16}\) PSBR covers consolidated general government as well
as public enterprises and corporations.
1992/93, primarily as a result of the rising fiscal deficit.

The relatively modest size of past deficits has tended to hide the increasing importance of government within the economy. The GDP share of public expenditure and revenue has increased significantly in South Africa since the 1950s. As shown in Table 2.6, this trend has been especially marked in recent years. Between the beginning of the 1980s and 1992/93, the share of consolidated general government revenue in GDP increased from 27 percent to 31 percent, while the corresponding expenditure share increased from 31 to 41 percent. In FY 1992/93, current expenditure exceeded current revenues not only in the central government's main budget, but for the public sector\(^\text{17}\) as a whole.

There have been important changes in the composition of government expenditure. As shown in Table 2.6, recurrent expenditure has risen as a share of total government expenditure from around 70 percent in the late 1970s and early 1980s to nearly 86 percent. There has been a corresponding decline in the share of capital expenditure, although this trend has been reversed in the last two budgets. This observed sharp increase in recurrent expenditures resulted from increases in the government wage bill and from rising spending on "other goods and services" and increases in

\(^{17}\text{Consolidated central government (main budget account plus extra-budgetary institutions and funds, including the "homelands") plus local and provincial administrations and public enterprises and corporations.}\)
Table 2.6: Shares and Rates of Growth in General Government Expenditure, Revenue and the Fiscal Deficit (Percent)

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<td>34.9</td>
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<td>Other goods and services</td>
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<td>Subsidies</td>
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<td>10.0</td>
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<td>12.7</td>
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<td>Taxes on net income and profits</td>
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<td>Taxes on goods and services</td>
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<td>25.7</td>
<td>28.8</td>
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<td>27.2</td>
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<td>Other taxes</td>
<td>8.0</td>
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<td>6.7</td>
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<td>Non-tax revenue</td>
<td>20.6</td>
<td>16.8</td>
<td>14.5</td>
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<td>Capital revenue and grants</td>
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<td>0.6</td>
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<td>Total revenue</td>
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<td>100.0</td>
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<td>Total expenditure</td>
<td>2.2</td>
<td>2.9</td>
<td>3.5</td>
<td>8.4</td>
<td>0.5</td>
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<tr>
<td>Total revenue</td>
<td>4.0</td>
<td>2.2</td>
<td>2.0</td>
<td>-2.2</td>
<td>-3.0</td>
<td>-3.0</td>
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<tr>
<td>GDP</td>
<td>4.0</td>
<td>0.3</td>
<td>0.7</td>
<td>-0.7</td>
<td>-0.4</td>
<td>-2.7</td>
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<tbody>
<tr>
<td>Total expenditure</td>
<td>31.3</td>
<td>32.8</td>
<td>36.2</td>
<td>36.5</td>
<td>36.8</td>
<td>40.6</td>
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<tr>
<td>Total revenue</td>
<td>27.1</td>
<td>28.7</td>
<td>31.2</td>
<td>32.0</td>
<td>31.2</td>
<td>31.1</td>
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<tr>
<td>Fiscal deficit</td>
<td>-4.2</td>
<td>-4.1</td>
<td>-5.0</td>
<td>-4.5</td>
<td>-5.6</td>
<td>-9.5</td>
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<tr>
<td>Primary deficit</td>
<td>-1.6</td>
<td>-0.6</td>
<td>-0.2</td>
<td>0.3</td>
<td>-0.7</td>
<td>-2.7</td>
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</table>

Source: Calculations based on SARB data. Fiscal years ending March 31. Data for 1993 are preliminary.
interest payments. The share of general government expenditure allocated to remuneration of government employees increased from an annual average of 26.5 percent in FY 1977/78-81/82 to 31.4 percent during FY 1982/83-86/87 and further to 34.9 percent in FY 1987/88-92/93. The corresponding increase for spending on "other goods and services" increased from 23.7 percent to 24.9 percent and then to 25.3 percent. The most important factor causing the sharp increase in the government wage bill was the increase in the number of state employees such as teachers, nurses and police officers, in the central government and homelands.

In recent years, growth in revenue has lagged growth in expenditure. Taxes rather than non-tax revenue have been the major factor accounting for revenue growth. Taxes on income and profits have broadly risen in line with income growth, while indirect tax revenue has risen from 17 percent of tax revenue in the late 1970s to 27 percent in FY 1992/93. Growth in indirect taxation was accelerated by the introduction of a general sales tax (GST) in 1978 and subsequent increases in the tax rate. The GST was replaced by a VAT in 1991. Non-tax revenue decreased from an average of 21 percent of total government revenue at the turn of the 1980s to 15 percent currently. This fall in the relative importance of non-tax revenues stems from slow growth in income from property. The contribution made by property income fell from 12.4 percent of government revenue in the early 1970s to between 4 and 7 percent in the late 1980s.
Chapter III

SOURCES OF DECLINING GROWTH

This chapter addresses the question of why growth performance declined over much of 1965-92. The answers to this question provide guidance as to how South Africa's growth performance may be improved. If the experience of the past two decades or so were repeated, it is likely that the country would have to choose between maintaining a very high rate of investment with mounting foreign debt, or resigning itself to low or even negative per-capita income growth. But if the sources of low and declining growth can be identified, then it is possible that past trends can be reversed, and the economy moved to a higher growth path.

Four sets of factors seem to explain the behavior of GDP growth. First, there is little doubt that the level of investment and hence the rate of growth of the economy's capital stock has had a central influence. Movements in investment cannot fully account for the behavior of GDP growth, however, as the productivity of capital has tended to decline over time. Second, over much of the period, investment was increasingly channeled towards public-sector activities with much lower productivity than those of the private sector. Third, the structure of incentives has encouraged investment in low-productivity manufacturing sub-sectors and in other parts of the economy including mining and capital-intensive agricultural activities. This has meant that, even within the private sector, industries with the lowest productivity have tended to grow most quickly. Across the economy as a whole, movements in factor prices have hindered the full use of labor -- South Africa's main surplus resource. Although this may have had only a minor depressant effect on GDP growth, it has slowed employment growth and raised unemployment. Fourth, a low skill base and slow upgrading of the skills of the workforce have inhibited productivity growth. Growth in labor input per worker may have been further retarded by the deteriorating productivity of unskilled workers attributable to a deteriorating urban environment and increasing industrial conflict.

1. Level of Investment: High but Declining over the 1980s and 1990s

Total investment in South Africa grew steadily from the immediate post-War period until the middle of the 1970s. What is remarkable is the high level of the investment-to-GDP ratio in South Africa compared to other middle-income economies. This peaked at an average of 26% in the 1971-76 period -- a higher ratio than that of most middle-income economies following import-substitution development strategies like (Mexico, Brazil, and Chile) and comparable only to countries that were following export-promotion growth strategies such as Malaysia and Korea. Only in the 1980s did these export-oriented economies surpass South Africa in relative size of
investment effort.

The behavior of total investment hides a range of different behavior patterns on the part of different institutions. Here it is particularly important to distinguish between the public (government and the parastatals) and the private sector. Public investment grew rapidly from 1946 till 1979-1980. Growth was especially high during 1961-65 and 1971-75 when the annual average real growth rate exceeded 10 percent. After 1980, the trend in public-sector investment growth was dramatically reversed with annual growth rates averaging -3.3 percent and -6.5 percent over 1981-85 and 1986-91 respectively. A closer inspection of the sub-components of public investment, as in Figure 3.1, shows that investment by government was the first indicator to start falling during the 1976-1980 period, followed by a decline in parastatal investment only after 1979. This fall in parastatal investment became more accentuated after 1985. This is in part, because of the privatization of much of Sasol in 1987 and of Iscor in 1989. Movements in private investment closely parallel those of the parastatals, but show a more clear-cut response to the recessions and temporary recovery in the economy experienced since 1985.

Public investment changed over time in response to policy decisions and economic stimuli that affected risk and expected profitability. The public investment program has had three main aims: to extend and develop infrastructure mainly in areas reserved for whites; to expand public utilities selling services to the household and industrial sectors; and to promote self-sufficiency in areas likely to be affected by sanctions. Investment by central government and the public business enterprises such as Transnet (formerly South African Transport Services) and the former Department of Posts and Telecommunications was essentially directed towards providing economic and infrastructural services. In the early and mid-1970s, investment in railways was still an important component. After 1976, in the aftermath of the Soweto riots, investment by public authorities (government and public business enterprises combined) dropped sharply and has never regained its former level. The public corporations are more important in the production sectors, and here the propensity to invest has varied. For example, investment in electricity, water and gas doubled during 1974-77 through the efforts of Eskom and the Rand Water Board. Different periods saw substantial expansion in the "strategic" industries producing synthetic fuels (Sasol and Mossgas), iron and steel (Iscor), and armaments (Armscor/Denel).

Earlier World Bank research on parastatal investment in South Africa, suggests that parastatals also respond to changes in economically-relevant variables. Heavy parastatal investments were guided by optimistic growth

1 The term "parastatal" here refers to both the Public Business Enterprises such as Transnet (formerly South African Transport Services) and the Post Office and Public Corporations such as ESKOM (the electricity-generating authority). While both categories of parastatal are controlled by government, through ownership or the right to appoint members of the board, Public Business Enterprises, unlike Public Corporations, have to seek the approval of the legislature for their budgets.

projections and led to saturation in white infrastructure. Movements in the real interest rate had some effect. Before 1985, parastatals had borrowed substantially from abroad with forward cover for exchange rate movements provided by the Reserve Bank. The financial sanctions imposed in 1985, forced parastatals into the domestic financial market at a much higher interest rate than they had been paying. This, along with growing excess capacity, may further explain why parastatal investment dropped so profoundly.

Private sector investment has responded to domestic demand (see Annex A). This indicates that the public sector carried important consequences for other parts of the economy. An expansionary policy on the part of the government or the parastatals would have tended to stimulate private investment through increasing of aggregate demand.

These conclusions seem to accord with the investment history of South Africa before 1990. The weak tendency for expansion in the level of investment has been choked off by either a need to limit movements in the balance-of-payments position or by rising interest rates resulting from increased borrowing by the public sector. In general, fluctuations in the level of investment were accommodated through corresponding movements in the external current account, although this was constrained, even before 1985, by counteracting policy actions. There is no evidence that real interest rates rose in response to increases in the fiscal deficit or the public-sector-borrowing requirement. The
authorities followed a monetary policy under which the interest rate became a matter of policy rather than a market-determined rate.

In this picture, investment has been driven largely by internally-generated forces. In South Africa's historical development, exports were generated by the mining sector, while the manufacturing and other sectors were pulled along by import-substitution policies. The potential for further import substitution has largely been exhausted. Over subsequent decades, the supply side of the economy has increasingly been driven by changes in domestic aggregate demand generated through population growth, movements in the terms of trade, other internal and external disturbances, and the actions of government. In this context, the private sector has been relatively passive. The secular increase in government expenditure as a proportion of GDP kept much of the economy at levels close to full capacity for many years, but contributed to a gradual fall in capital productivity and decline in the growth of GDP and employment.

Over the last three years, however, the fiscal deficit has risen rapidly, while private investment has slumped. The most likely explanation for this is that the confidence of the private sector has been shaken badly by growing political uncertainty and the rising evidence of violence. This explanation is certainly consistent with the results of business confidence surveys.

Declining Productivity of Investment and Capital

While there can be little doubt that investment has been a major influence on economic growth, it is also clear that the decline in GDP growth cannot be entirely attributed to the decline in the investment rate after 1975. Following heavy investment during the 1960s and mid-1970s, the total capital stock grew rapidly and, as shown in Figure 3.1, achieved a peak growth rate on a 5-year-annual-average basis of about 7 percent in 1975. While the trend in capital stock growth has remained positive since then, it has declined steadily since the mid-1970s. While it is clear that the behavior of capital-stock growth has had a positive influence upon GDP growth, Figure 3.2 shows that major deviances between the two growth rates have arisen. Through 1960-67, there was relatively little difference in the rates of GDP and capital-stock growth and the output-to-capital ratio remained reasonably constant. The situation changed radically after 1967, however, and the two growth rates began to diverge with the output-to-capital ratio declining by as much as 3 percent per year. The temporary recoveries in the economy following the gold-price boom of 1979-80 and the revival in 1987-88 had the effect of pushing GDP growth back up towards that of capital stock, while the two growth rates have virtually converged at a common low level of between 1 and 2 percent a year since 1988.

Movements in capital-stock growth alone cannot fully explain the progressive decline in GDP growth; one must seek further explanations of the chronic decline observed in capital productivity.
2. A Shift Toward Lower-Productivity Capital Stock in the Public Sector

Although the expansion of public investment stimulated the economy by supporting aggregate demand, it also increased the share of the capital stock in sectors with much lower-than-average output-capital ratios and higher-than-average capital-labor ratios, thus resulting in slower growth in output and employment. Overinvestment in the parastatal sector before 1985 led to substantial underused capacity. Paradoxically, however, the drop in parastatal investment from 1984 onwards played an important part in encouraging recessionary tendencies in the economy by depressing aggregate demand.

The capital stock has grown rapidly in South Africa, particularly during the 1960s and 1970s. However, the pattern of investment since the mid-1960s resulted in a restructuring of the country’s capital stock under which the private sector progressively lost its prominence of the 1960s. As shown in Table 3.1, in 1961, the private sector accounted for 53.4 percent of the total capital stock — a proportion that declined to 42.3 percent by 1991. During the 1960s, government experienced the fastest growth in its capital stock, but through the 1970s and first half of the 1980s, this distinction belonged to the parastatal sector. Given the substantial drop in parastatal investment since 1984, the private sector has since increased its share of the country’s capital stock, although this is partly due to the recent privatizations.

The biggest parastatal investments were in the transport system, for example, railways,
Table 3.1: Distribution and Growth of Capital Stock by Type of Institution (1960-92)

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<td>29.6</td>
<td>33.4</td>
<td>33.8</td>
<td>26.8</td>
</tr>
<tr>
<td>General government</td>
<td>19.7</td>
<td>21.8</td>
<td>23.6</td>
<td>24.4</td>
<td>24.3</td>
<td>23.4</td>
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<tr>
<td>Total capital stock</td>
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<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Growth Rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>4.0</td>
<td>4.9</td>
<td>5.7</td>
<td>3.1</td>
<td>4.1</td>
<td>3.3</td>
<td>4.1</td>
</tr>
<tr>
<td>Parastatals</td>
<td>4.9</td>
<td>6.4</td>
<td>8.4</td>
<td>7.4</td>
<td>4.2</td>
<td>-2.7</td>
<td>4.5</td>
</tr>
<tr>
<td>General government</td>
<td>7.0</td>
<td>7.7</td>
<td>7.7</td>
<td>4.8</td>
<td>3.1</td>
<td>2.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Total capital stock</td>
<td>4.8</td>
<td>5.9</td>
<td>7.0</td>
<td>4.9</td>
<td>3.9</td>
<td>1.2</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Source: Reserve Bank of South Africa

Airlines and ports, and in telecommunications and electricity. The result of this shift is that South Africa today has substantial excess capacity in its major utilities. For example, ESKOM has a generating capacity of some 35,000MW of which about 5,000MW is unused. There is also much unused capacity in the railways and in some sub-sectors in manufacturing such as iron and steel and in the production of synthetic fuels.

The productivity of capital as measured by the output-to-capital ratio is much higher in the private sector than within the parastatals. As shown in Figure 3.3, there has been a huge gap between private and parastatal sectors in terms of their respective productivities over the entire period -- what is particularly striking is the difference in absolute terms between the output-to-capital ratio in the private sector (about 0.6) and that of the parastatal sector (less than 0.2). As the value-added of government is measured on a cost basis (essentially the real value of the civil service wage bill), no comparable measure of government productivity can be given. However, as shown in Tables 3.1, the distribution of capital stock has varied much more between the private and parastatal sectors than between government and the rest. The private/parastatal distinction is thus vitally important.

In addition to the wide disparity between sectors, the output-to-capital ratios show a declining trend -- -0.9% per annum for the private sector and -0.6% for the parastatals.
The redirection of capital stock away from the private sector with an output-to-capital ratio of 0.6 towards parastatals with a corresponding ratio of about 0.2 has had a significant effect on GDP growth. To get a measure of this, the level of GDP is simulated for each year since 1960 under the hypothesis that the relative proportions of total capital stock in the private and parastatal sectors remained unchanged from 1960 onwards. The contribution of government to GDP, and the levels of the output-to-capital ratios within sectors are, however, set equal to those values that actually prevailed over time. As shown in Figure 3.4, with more investment resources allocated to sectors with lower productivity, there is a distinct depression in the level and rate of growth in GDP. The effect of the reallocation in the composition of capital stock was minimal during the 1960s, but increased considerably during the second half of the 1970s and the early 1980s. At its peak around 1980, the reallocation effect accounted for a drop of about 10 percent of GDP and hence the aggregate output-to-capital ratio in terms of the potential foregone through the diversion of the nation's resources in favor of parastatals. The impact of capital reallocation diminished after the mid-1980s, but this was at least partly due to privatizations.

While the reallocation effect is very significant (particularly during the 1970s), it explains only a minor part of the secular decline in capital productivity observed since the mid-1960s. This point is illustrated in Table 3.2, which shows the contribution to capital-productivity growth made through the
reallocate capital stock in favor of the parastatal sector. In the first half of the 1960s, capital productivity grew by 1.09 percent per year, and, given that the reallocation effect was minimal during this period, the contribution of unidentified sources of productivity growth was somewhat higher at 1.26 percent per year. Throughout the second half of the 1960s and the 1970s, both productivity-growth sources proved to be negative, with the reallocation effect dominating during the period, 1976-80. The picture changes during the 1980s, as the reallocation effect becomes positive. The positive contribution of improved capital composition post-1985 is exaggerated in view of the privatizations of Sasol and Iscor. The contribution of other factors that have constrained growth, such as inadequate acquisition of skills has been consistently negative since the mid-1960s.

3. Incentives Encouraging Capital Intensity

The structure of factor prices faced by producers in South Africa has encouraged capital-intensive industries and the adoption of more capital-intensive production techniques. The discussion focuses here on two major features: the tendency for the real user cost of capital to be lower in capital-intensive sectors and the effects of rising wages. These have encouraged capital-intensive sectors and the adoption where relevant of more capital-intensive production methods.

Figure 3.4

![Simulated Potential GDP](chart)

- Simulated GDP
- Actual GDP

<table>
<thead>
<tr>
<th></th>
<th></th>
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<tr>
<td>Millions of Rand$ at 1995 Price</td>
<td>20000</td>
<td>40000</td>
<td>60000</td>
<td>80000</td>
<td>100000</td>
<td>120000</td>
<td>140000</td>
<td>160000</td>
<td>180000</td>
<td>200000</td>
<td>220000</td>
</tr>
</tbody>
</table>
Table 3.2: Decomposition of Sources of Declining Capital Productivity

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Annual Average Growth Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>GDP (Y)</td>
<td>5.94</td>
<td>5.15</td>
<td>3.49</td>
<td>3.13</td>
<td>1.36</td>
<td>1.26</td>
</tr>
<tr>
<td>Capital stock (K)</td>
<td>4.85</td>
<td>5.94</td>
<td>6.97</td>
<td>4.87</td>
<td>3.91</td>
<td>0.09</td>
</tr>
<tr>
<td>Capital productivity (Y/K)</td>
<td>1.09</td>
<td>-0.79</td>
<td>-3.48</td>
<td>-1.74</td>
<td>-2.55</td>
<td>1.17</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changing composition of K</td>
<td>-0.17</td>
<td>-0.27</td>
<td>-0.59</td>
<td>-1.15</td>
<td>0.31</td>
<td>1.38</td>
</tr>
<tr>
<td>Other factors</td>
<td>1.26</td>
<td>-0.52</td>
<td>-2.89</td>
<td>-0.61</td>
<td>-2.86</td>
<td>-0.23</td>
</tr>
</tbody>
</table>

Source: Staff Calculations

Industrial Incentives

The industrial incentive structure reflects the manner in which the tax regime has supported the industrial policy of "strategic" investments aimed at reducing South Africa's external dependence. Not surprisingly, the fastest rates of capital accumulation have mainly been in those natural resource-based subsectors closely linked with the mining sector, which faced the lowest user costs of capital. Many of these industries are dominated by large capital-intensive public sector firms; this partly explains the increase in parastatal investment. In addition, ongoing work indicates that the effective capital subsidy rate (that is, the subsidy equivalent of the various tax allowances) is heavily biased toward the most capital-intensive subsectors. This suggests that the corporate tax regime has been important here.

The real user cost of capital is a function of many variables, including among other things: the rate of inflation, the corporate tax rate, tax concessions (investment, initial, and depreciation (wear and tear) allowances, the cost of debt finance, and the required return on equity. In general, because the structure of borrowing and the corporate tax rate are assumed constant across firms, the user cost of capital is primarily driven by the expected real interest rate, the rates of economic depreciation of capital in the different industries, the composition of investment across industries and the aggregate tax concessions. The user cost of capital in South Africa is characterized by high

3 See Annex B for further details.
4 In 1991, a new tax incentive program was introduced under Section 37E of the Income Tax Act to encourage exports of selected products.
5 Some industries received forward foreign exchange cover over the period.
marginal corporate tax rates and generous tax concessions. Before 1980, the user cost fluctuated widely. Between 1980 and 1983, it declined dramatically as the real interest rate fell to negative levels. Since 1983, it has shown an upward trend (with declines in 1987 and 1988); this is partly because the rapid depreciation of the rand raised the price of imported capital goods. The real interest rate rose rapidly and became positive as interest rate ceilings were removed.

An examination of the real user cost of capital across sub-sectors illustrates the links to "strategic" investments, the bias of the tax regime towards highly capital-intensive sectors, and its inflexibility over time across sub-sectors, despite its improvement in recent years. Table 3.3 presents the real user cost of capital for individual industries, rankings for the user cost in ascending order, and the change in rankings between two periods -- pre- and post-1983. Three main points emerge:

- the real user cost varies across sub-sectors, and the variation reflects different sub-sectoral capital intensities, that is, the most capital-intensive subsectors faced lower user costs. The user cost is lowest in paper, non-ferrous metals, iron and steel, non-metallic products, and chemicals, all of which are either dominated by large resource-based capital-intensive public sector firms (such as ISCOR, SASOL) or have had a special program in the past (paper); it is highest in textiles, wood, clothing, other transport equipment, rubber, and metal products, all of which tend to be dominated by privately-owned firms;

- the real user cost of capital is higher after 1983, increasing in every industry except basic iron and steel, reflecting higher real (and expected real) lending rates, higher corporate taxes, and fewer tax credits as investment allowances were phased-out and initial allowances were reduced.

- the user cost of capital rankings among sub-sectors has remained relatively stable. This implies that differences in incentives between industries have also remained stable, despite the overall trend towards more market-driven incentives. There are a few exceptions -- notably the iron and steel industry, non-metallic products, and textiles. The user cost of capital fell in iron and steel relative to other manufacturing industries because its user cost stayed constant while it increased in every other industry. Non-metallic products also faced lower user costs. In textiles, the user cost of capital increased relative to the rest of the sector (but this probably was offset by other incentives enjoyed by the industry through the trade regime and the Structural Adjustment Program (SAP)).

The tendency for the real user cost of capital to be lower in the more capital-intensive activities gives producers a greater incentive to invest in these industries. This may explain why there has been a channeling of investment towards manufacturing sub-sectors with low capital productivity. Over 1972-90, for
### Table 3.3: Real User Cost of Capital

<table>
<thead>
<tr>
<th></th>
<th>1972-83</th>
<th>1984-90</th>
<th>1972-90</th>
<th>Change in Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Manufacturing</td>
<td>5.6</td>
<td>7.1</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>Food, beverages and tobacco</td>
<td>5.6 (9)</td>
<td>7.0 (7)</td>
<td>2.0</td>
<td>(2)</td>
</tr>
<tr>
<td>Textiles</td>
<td>9.7 (14)</td>
<td>1.4 (14)</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Clothing, leather and footwear</td>
<td>5.4 (8)</td>
<td>9.2 (12)</td>
<td>6.8</td>
<td>4</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>7.4 (13)</td>
<td>11.0 (13)</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>Paper and paper products</td>
<td>3.6 (1)</td>
<td>5.2 (1)</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Industrial chemicals</td>
<td>4.7 (4)</td>
<td>6.5 (5)</td>
<td>5.4</td>
<td>1</td>
</tr>
<tr>
<td>Other chemicals</td>
<td>4.9 (5)</td>
<td>6.6 (6)</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Rubber and plastic</td>
<td>4.9 (5)</td>
<td>8.5 (9)</td>
<td>6.2</td>
<td>3</td>
</tr>
<tr>
<td>Non-Metallic products</td>
<td>5.0 (7)</td>
<td>6.4 (4)</td>
<td>5.5</td>
<td>(3)</td>
</tr>
<tr>
<td>Basic iron and steel</td>
<td>5.7 (10)</td>
<td>5.5 (2)</td>
<td>5.7</td>
<td>(7)</td>
</tr>
<tr>
<td>Basic non-ferrous metals</td>
<td>3.6 (2)</td>
<td>5.5 (2)</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Metal products and machinery</td>
<td>6.2 (11)</td>
<td>8.8 (10)</td>
<td>7.2</td>
<td>(1)</td>
</tr>
<tr>
<td>Transport equipment</td>
<td>6.6 (12)</td>
<td>9.0 (11)</td>
<td>7.5</td>
<td>(1)</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>4.5 (3)</td>
<td>7.5 (8)</td>
<td>5.6</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: M. Schankerman, Bank estimates

Notes: 1. In the first two columns the rank in ascending order is given in parentheses.
2. In the last column, the number in parentheses gives the fall in the ranking of the sector, while "---" indicates no change.

example, industries with the lowest capital productivity at the beginning of the period accumulated capital more quickly than others -- the simple correlation coefficient between the initial output-capital ratio and capital-stock growth is -0.59. A similar consideration may have applied within mining as this sector receives substantial special tax advantages which may have considerably depressed the real user cost of capital and encouraged investments that would otherwise have been unprofitable.

In agriculture, subsidized low interest rates and various tax breaks encouraged the excessive substitution of capital for labor. Such capital/labor substitution resulted in declining capital efficiency. As a result, over-mechanization was widespread in South African agriculture after 1970, although this started to change with the withdrawal of much capital subsidization in the mid-1980s. Several studies found that the most productive and profitable farm enterprises had the least real investment in machinery and equipment per

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6 See the studies by Bell and Padayachee (1984), Volkskas Bank (1990), and Mostert (1990).
hectare. In their recent study of agricultural resource use and productivity, van Schalwijk and Groenewald find that the use of tractors has been so extensive that the marginal productivity of tractors is effectively zero. At the same time, the marginal productivity of labor is highly positive, implying that a straightforward substitution of labor for capital will improve output and efficiency. South African agriculture has thus made sub-optimal use of labor.

**Rising Cost of Labor**

In the natural growth path that one would expect in a country such as South Africa, the surplus resource -- unskilled black labor -- would be absorbed quickly into productive employment. This would be consistent with the highest possible rate of growth given investment behavior, and with progress towards reducing inequality in the distribution of income. Such a path is obstructed if the real wage of unskilled labor rises before the labor surplus is exhausted or if the cost of capital is artificially lowered. This would tend to raise capital intensity, lower capital productivity and slow the growth of output and employment. In South Africa, both growth-inhibiting influences have been evident. Movement in the absolute values of the cost of capital and the real wage will affect output growth, not just the ratio between them.

There is some evidence that increased capital-intensity in the non-government sector in South Africa has arisen partly because the cost of using capital has fallen relative to the cost of employing black workers. Earlier work indicates a negative relationship between capital intensity, (as measured by the ratio of non-government capital stock to black employment), and the ratio of the user cost of capital to the real black wage, and that movements in these factor prices have contributed to the slowdown in growth and employment over 1970-85. Further work has since indicated that, in the absence of such change in factor prices, employment growth among blacks would have been about 0.9 percent per year higher over 1970-85.

Of the costs of capital and labor, movements in labor cost (the real wage) have had the greatest economic effects. While the user cost of capital fell during 1973-83, when real interest rates were maintained at a negative level, the movements in this variable are, in general, proportionately much less than those in real wages. This user-cost has risen again during the 1980s. White real wages in manufacturing, for example, have grown progressively more slowly since the 1960s, while black wages have grown more quickly.

Conflicting forces have operated on the African real wage. Increased unemployment among Africans has acted as a brake upon real wage growth. Between 1980 and 1990, the increase in the proportion of the African labor force not having wage jobs may have reduced the African real wage by as much as 8.7 percent below the level that would have otherwise prevailed. This represents a contribution to the average annual increase in the real African wage of -0.91 percent. The surplus of

---

7 See for example, Van Rooyen (1973), Viljoen and Groenewald (1977), and Janse van Rensburg and Groenewald (1987).

African labor has risen continuously since 1970. However, it is only relatively recently that African wages have started to fall. Three influences were identified in the empirical analysis as having put upward pressure on the African wage. These are: increased strike activity; the decline and abolition of influx controls; and an ongoing tendency for African real wages to move progressively towards white real wage levels.

Econometric analysis of wage behavior indicates that increased union activity, as measured by strikes per African employee, may have raised African real wages by as much as 15 percent between 1979, the year of legalization of African unions, and 1990. This effect is equivalent to an average annual real wage increase of 1.27 percent. The decline and eventual abolition of the apartheid system of influx controls also seems to have raised African real wages, and it is estimated that this led to an increase in the African real wage of 9.4 percent between 1975 and 1985 -- an average annual increase of about 0.9 percent.

The empirical results also indicate that African real wages have progressively been pulled closer to the level of the real white wage. This may reflect reduced discrimination, increased pressure on employers to reduce inter-racial wage differentials, and some convergence in skill levels between Africans and whites. It is difficult to separate the quantitative importance of these different effects. Their joint influence is estimated as having raised the African real wage at an annual rate of around 2.5 percent over the 1970s, when white real wages were rising, but as having had a negligible effect during the 1980s, when white real wages were in a decline. So while reduced discrimination and so on have lead to a sustained closing-the-gap effect, there is an additional influence on the African real wage arising from movements in the real wage of whites. This suggests an additional but minor mechanism through which African wages may have adjusted to changing economic conditions.

4. Slow Growth in Labor Quality

In most fast-growing economies, improvements in the skills of the workforce are critical to growth. This has the effect of raising total factor productivity growth as conventionally measured and of offsetting the decline in capital productivity that tends to follow rapid investment. In South Africa, skill accumulation has been inadequate, and there has been a growing imbalance between the nation's stocks of physical and human capital. The work input of unskilled and even of some skilled workers may have deteriorated in the face of social tensions, locational distortions and growing industrial unrest.

Insufficient Improvement in Skills

The huge inequity in skill levels across different parts of the labor force is reflected in the educational and occupational attainments of black and white workers. In 1985, the Population Census concluded that in South Africa (exclusive of the TBVC states), 25 percent of African workers had received no schooling, while 99 percent of whites had received four or more years of education. In the population as a whole, it is believed that about 45 percent of blacks cannot read or write while the illiteracy rate among whites is
relatively trivial. The occupational structure of black and white workers reveals comparable inequalities. In total, the South African labor force is relatively uneducated and unskilled compared to other countries at a similar stage of development.

The overall literacy rate and the average years of schooling per worker are well below international norms. Given the overall capital-intensity of South Africa relative to other countries with a similar GDP per capita, there is a marked imbalance between the 'quality' of labor input and the size of the capital stock. Although some upgrading of the labor force skills has been taking place, particularly over recent years, this imbalance persists. While there are insufficient data to directly measure the growth of overall labor input (that is, after adjusting for changes in quality per worker) with any accuracy, it is likely that one source of reduced economic growth has been labor input growth that failed to keep pace with capital growth. Looking to the future, the returns to improving the skills of much of the workforce should be high in an expanding economy.

There has indeed been a substantial improvement in educational attainment. As Table 3.4 shows, the proportions of blacks in the labor force with little or no education have fallen markedly over the period, 1970-85, while the proportions with, for example, Standard 7 or above have increased. For Africans, however, penetration is still very limited at diploma and degree level. It is possible to use this information to get a measure of the potential input from each racial group adjusted for educational level. The basic method is to weight individuals of a given educational level by the ratio of their wage to that of a person with no education\(^9\). Persons with no education are thus given a weight of unity.

Labor input per worker, thus calculated, rose among Africans from 1.23 in 1970 to 1.39 in 1985 -- an average annual growth rate of 1.3 percent. It is of course possible that growth in educational qualifications was higher among formal sector employees than in the labor force as a whole. Data collected by the Bureau of Market Research (BMR)\(^10\) were used to provide a partial check on this as these data are restricted to wage employees. Applying the same method to the BMR data indicates that, when adjusted for education, labor input per African worker rose at an annual percentage increase of 0.3 percent over 1970-85.

Evidence from occupational surveys of employees also suggests that skill levels have increased over the past 20 years. Table 3.5 gives the proportion of employees in administrative, professional and clerical occupations for selected years for 1960-85. As measured by this indicator, the skill levels of Asians and Coloreds grew more quickly than those of other groups. The growth in White skills was the slowest. However, virtually all growth in occupational attainment has occurred since 1970. While the indicator shown is very

---

\(^9\) Potential labor input for each group, \(I\), is defined as
\[ I = \sum (w_j/w_0) L_j, \]
where \(L_j\) is the labor force in the \(i\)th educational category, \(w_j\) is the wage, and \(w_0\) is the wage of persons with no education. The relative wages, \((w_j/w_0)\), used are those for whites in 1980 as taken from the Population Census. These should be less distorted by the effects of discrimination than those for other racial groups.

\(^10\) These data are summarized in Hofmeyr (1990).
### Table 3.4: Economically Active Population by Education and Race

<table>
<thead>
<tr>
<th></th>
<th>Africans</th>
<th>Asians</th>
<th>Coloreds</th>
<th>Whites</th>
<th>Africans</th>
<th>Asians</th>
<th>Coloreds</th>
<th>Whites</th>
</tr>
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<tbody>
<tr>
<td>1970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>No Educ.</td>
<td>49.70</td>
<td>7.94</td>
<td>21.50</td>
<td>0.60</td>
<td>25.59</td>
<td>3.46</td>
<td>12.15</td>
<td>1.48</td>
</tr>
<tr>
<td>&lt; Std. 4</td>
<td>22.90</td>
<td>13.17</td>
<td>21.73</td>
<td>0.63</td>
<td>23.82</td>
<td>5.22</td>
<td>16.80</td>
<td>0.00</td>
</tr>
<tr>
<td>Std. 4</td>
<td>7.25</td>
<td>9.51</td>
<td>10.76</td>
<td>0.75</td>
<td>9.10</td>
<td>3.98</td>
<td>9.20</td>
<td>0.00</td>
</tr>
<tr>
<td>Std. 5</td>
<td>6.51</td>
<td>13.38</td>
<td>13.29</td>
<td>1.38</td>
<td>10.36</td>
<td>7.03</td>
<td>13.07</td>
<td>1.09</td>
</tr>
<tr>
<td>Std. 6</td>
<td>7.91</td>
<td>26.76</td>
<td>16.34</td>
<td>13.52</td>
<td>11.63</td>
<td>18.43</td>
<td>16.72</td>
<td>4.63</td>
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<tr>
<td>Std. 7</td>
<td>1.78</td>
<td>6.88</td>
<td>6.19</td>
<td>8.88</td>
<td>5.48</td>
<td>7.84</td>
<td>9.43</td>
<td>3.76</td>
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<tr>
<td>Std. 8</td>
<td>1.97</td>
<td>10.13</td>
<td>6.22</td>
<td>24.72</td>
<td>6.87</td>
<td>16.75</td>
<td>10.14</td>
<td>19.98</td>
</tr>
<tr>
<td>Std. 9</td>
<td>0.95</td>
<td>3.35</td>
<td>1.12</td>
<td>6.27</td>
<td>2.06</td>
<td>7.84</td>
<td>2.88</td>
<td>5.93</td>
</tr>
<tr>
<td>Std. 10</td>
<td>0.39</td>
<td>5.06</td>
<td>1.43</td>
<td>28.10</td>
<td>3.51</td>
<td>18.35</td>
<td>4.90</td>
<td>31.06</td>
</tr>
<tr>
<td>Diploma</td>
<td>0.61</td>
<td>2.59</td>
<td>1.89</td>
<td>9.68</td>
<td>1.41</td>
<td>7.58</td>
<td>4.22</td>
<td>22.06</td>
</tr>
<tr>
<td>Degree</td>
<td>0.02</td>
<td>1.23</td>
<td>0.14</td>
<td>5.47</td>
<td>0.16</td>
<td>3.51</td>
<td>0.49</td>
<td>10.02</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>5419</td>
<td>210.6</td>
<td>807.4</td>
<td>1674</td>
<td>8501</td>
<td>341</td>
<td>1208</td>
<td>2232</td>
</tr>
<tr>
<td></td>
<td>6675</td>
<td>329</td>
<td>1143</td>
<td>3131</td>
<td>11837</td>
<td>597</td>
<td>1852</td>
<td>4613</td>
</tr>
<tr>
<td></td>
<td>1.23</td>
<td>1.56</td>
<td>1.42</td>
<td>1.87</td>
<td>1.39</td>
<td>1.75</td>
<td>1.53</td>
<td>2.07</td>
</tr>
</tbody>
</table>


Crude, it is consistent with the view of the National Manpower Commission which estimates that blacks as a percentage of high level manpower increased from 25.5 percent in 1965 to 35.6 percent in 1989. The difficulty with these measures, however, is that, given social pressures, employers may be redefining the job titles of blacks more favorably.

If measured correctly, labor input has grown more slowly than capital stock. The calculations presented in Table 3.4 suggest that total labor input calculated on the basis of the labor force grew at about 3.5 percent a year between 1970 and 1985, yet total capital stock grew at an average rate of 5.23 percent per year over the same period, implying that capital per unit of 'potential' labor input grew at about 1.7 percent a year. However, employment growth was even slower than labor supply growth (2.2 percent a year) at 1.6 percent. This implies that the growth of capital per unit of actual labor input grew at around 2.3 percent a year. This result is entirely consistent with the decline in capital-productivity growth noted earlier.

Of more importance, however, is that the returns in additional growth to raising the

---

11 See National Manpower Commission (1990). High level manpower is defined as workers with two years or more of training and an educational attainment of at least Standard 10.
Table 3.5: Skill Levels By Race
(percentage of employees in administrative, professional and clerical occupations)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Africans</td>
<td>5.0</td>
<td>4.7</td>
<td>7.2</td>
<td>8.8</td>
</tr>
<tr>
<td>Asians</td>
<td>19.1</td>
<td>22.8</td>
<td>33.4</td>
<td>37.4</td>
</tr>
<tr>
<td>Coloreds</td>
<td>9.9</td>
<td>10.5</td>
<td>16.6</td>
<td>18.9</td>
</tr>
<tr>
<td>Whites</td>
<td>49.5</td>
<td>48.1</td>
<td>56.4</td>
<td>56.9</td>
</tr>
</tbody>
</table>

Source: Manpower Survey, CSS (various issues).

skills of the labor force, and in particular those of the blacks, are likely to be very high. This was illustrated in an earlier study\(^\text{12}\) indicating through a series of scenarios, that upgrading 1 percent of the black workforce per year to the status of whites could raise annual GDP growth by as much as 2 percentage points. In the past, periods of economic upturn have always been quickly accompanied by the development of shortages in key skilled occupations. There can be little doubt that renewed economic growth in South Africa will have similar consequences, and that skill accumulation will become a policy priority.

**Deterioration in the Work Input of Unskilled Labor**

There is a strongly-held view in South Africa that the work effort of the unskilled workforce has deteriorated. There seem to be two plausible reasons for believing this view. First, the environment in which many black workers live has worsened. This may have reduced their effectiveness in the workplace. Second, there has been a dramatic increase in the number of workdays lost through strikes and other forms of industrial action.

One net effect of influx controls was to break up many families, leaving breadwinners in the towns and cities, and other family members in the homelands. This situation has changed considerably in the last decade. Although hard macro-quantitative evidence is lacking, there is no doubt that African urbanization has mushroomed, particularly in the township areas. Rising violence has been a disturbing feature of the environment in which many Africans live. Locational patterns within urban areas are still severely distorted, with Africans, in particular, but also Asians and Coloreds, living long distances from urban centers and places of employment. Black workers, often have an arduous journey to and from work, and many Africans still commute daily from homeland areas. The average commuting distance of urban blacks has been estimated at three times that of unskilled workers in more developed countries.\(^\text{13}\)

In addition to its inhibiting effect upon

\(^{12}\) See Fallon (1992).

\(^{13}\) See Jammie (1990).
Box 3.1 Spatial Distortions and Factor Productivity

The dispersion and fragmentation of urban settlements has resulted in inefficient infrastructure investments. Not only is the unit cost of supplying infrastructure high, but excess capacity in certain areas and limited capacity in others has led to low productivity of the existing network. In transportation, the inefficiencies of the spatial distortions are reflected in the annual subsidies for urban public transportation which amount to almost 1% of GDP and about 45% of the central government's expenditure on transportation and communication. In spite of this level of subsidy, black households on average spend more than 11% of their income on transportation -- a higher proportion than is spent on housing -- and are subject to average commuting times of over two hours daily. Spatial distortions have increased the cost of job search for the poor, decreased labor mobility, and reduced the time and financial resources for skill upgrading -- factors which have placed upward pressure on wages and further pushed the urban and national economy on to a more capital-intensive path; and had a negative impact on the direct generation of employment in the informal sector by increasing the cost of access to markets for outputs and inputs.

labor productivity, the locational structure is not conducive to the development of the informal sector. The constraints implied by long journey times to urban centers apply equally to informal sector workers. Women in particular are adversely affected given their greater need to work near home.

The rights of African workers to organize in trade unions were progressively eroded between 1953 and 1959. This changed in 1979 when registered African unions were re-legalized under the Industrial Conciliation Amendment Act. The effect on registered African membership has been staggering. In 1980, only about 1.2 percent of African employees were registered union members; by 1990, this had risen to over 30 percent. This has been accompanied by a massive rise in both the number of strikes involving Africans and in the number of workdays lost through strike action. For example, in 1980, about 175,000 workdays were lost through strikes; by 1992 this figure stood at nearly 2.8 million.

South African employers often claim that industrial unrest is an important impediment to industrial expansion. One recent study, based upon a survey of employers in the manufacturing sector, found that 'labor problems' defined very generally were cited as the most common cause of greater capital-intensity. One possible interpretation of this is that industrial conflict has widened the margin between the perceived cost of employing an

members are not classified by race, while no racial breakdown is available for unregistered trade union members.

14 An exact figure cannot be given for the proportion of Africans unionized, as some registered trade union

15 See the study by Welcher (1991).
African worker and the wage paid.

However, as unions grew rapidly and took on more of a regional and even national character, African unions sought a more centralized bargaining forum through the Industrial Councils.

As the rise of black trade unions is almost entirely confined to the period since 1980, the effects of increased industrial unrest upon productivity must necessarily be confined to the same period. There were, of course, strikes before 1980, but these were related to only the activities of white trade unions, and were on a much smaller scale on average than in the 1980s. Since 1980, strike activity by white unions has fallen to negligible levels.

5. Underutilization of Resources

The South African economy has be-
come increasingly vulnerable to the effects of domestic demand shocks. In general, the result of such episodes has been to drive the economy below its production potential with consequent increase in unemployment rates (even among whites). During such periods one would expect to find additional temporary falls in capital productivity. This seems to have been the case during all economic depressions before the present one. During the present recession, capital productivity has actually increased given the dramatic fall in parastatal investment since 1985.

The model presented in Annex A has been used to measure the divergence of potential from actual GDP (excess aggregate supply). Excess supply was virtually absent during the 1960s, but became apparent following: the decline in the gold price in 1981; the imposition of financial sanctions in 1985; and the beginning of the present recession in 1988. It is unlikely that these periods of excess supply have had any consistent effect on the trend in productivity, as they have so far occurred in a cyclical fashion. It is far more likely that their main effect was to depress the level of private investment. Nevertheless, it appears that, in 1993, the real GDP of South Africa lies at about 9 percentage points below its potential level. This value was forecast at around 8 percent for 1993, given alleviation of the drought. This suggests that a significant amount of real growth could be attained through fuller utilization of existing resources.
South Africa has followed an inward-looking industrialization path since the 1920s, when it adopted a protective stance towards the manufacturing sector. Although this allowed the country to escape some of the worst ravages of the international depression of the 1930s, it has meant that the economy has undertaken the production of commodities requiring progressively higher domestic costs per unit of foreign exchange saved. Historically, South Africa has relied largely upon its minerals and highly capital-intensive first-stage processing industries as the basis for export expansion, while most of its industrialization has been based upon other products for the domestic market favored by high protection. Over the last decade, the terms of trade have moved against primary products and simple manufactured goods. South Africa has thus lost much of its gains from trade, while its exports have not created sufficiently high income growth.

As the scope for import substitution became more limited, investors found it increasingly difficult to identify new areas of opportunity, and had increasingly to rely upon domestic demand expansion in existing markets. This reduced investment and further slowed growth as the economy became more volatile. Government policies tried to encourage new windows of opportunity by accommodating to pressures for increased protection. This seems, however, to have had progressively less impact on growth.

The central argument in this chapter is that past policies have had two powerful distorting effects. First, they have disproportionately skewed resources to highly capital-intensive upstream sectors of industry. In recent years, these upstream sectors have become more export-oriented, but their terms of trade are highly correlated with mining and have been declining. Second, past policies have biased producers in downstream, "end-stage" manufactures towards the domestic market, and against exporting. We believe that this constitutes a "source of growth foregone" in the history of the economy, and that a reversal of this position would be beneficial to future growth. Whether South Africa could have fully utilized this potential growth source, or indeed, whether it would have been rational to do so, given mounting international sanctions, remains unresolved.

The main characteristic of an outward-oriented approach is that resources are diverted towards commodities with low domestic resource cost per unit of foreign exchange. In South Africa, this means, in the absence of unrealistically high wage rates, and other incentives (reviewed in Chapter III) that bias activity towards upstream, capital-intensive activities, specialization in more labor-intensive...
activities. A more outward-oriented regime should benefit the economy by improving productivity performance and by permitting fuller use of capacity. Exporters are usually exposed to much more intense competitive pressures in quality and price, than producers relying on the domestic market. Export expansion is thus usually associated with an improvement in productivity. In addition, the expansion of output can subsequently lead to economies of scale and lower (marginal and average) costs. This is borne out by international experience. Any long-term sustained growth will be dependent on the ability of South African producers to keep up with production techniques through the development and absorption of new technology.

There has been a movement in South Africa towards a more open economy over the last few years by: reducing quantitative restrictions on imports, rationalizing tariffs, equalizing investment incentives across industries, and eliminating some of the gross distortions in agricultural subsidies. Exports of manufactures have grown much more quickly since 1985, and there is evidence that this has had a beneficial effect on productivity. Growth rates in GDP have, however, continued to stagnate because of declining investment arising from political uncertainties, rising social instability, and other factors discussed in Chapter III. One observes in South Africa low and secularly declining growth rates with almost zero productivity growth.

1. Why Export Orientation?

One attractive feature of a more export-oriented approach should provide a more consistent source of aggregate demand. The economy has been mainly driven by domestic demand in the past, and has been increasingly susceptible to problems of inadequate demand since the early 1970s. A further benefit of a more export-oriented approach, particularly one that seeks to broaden the export mix, would be to reduce the country’s vulnerability to global commodity cycles. South African manufacturer’s exports are heavily concentrated in a narrow range of commodities, whose terms of trade are highly correlated with mining and have been declining. So broadening the export base would help to cushion the South African economy from external shocks. Perhaps an even more important feature in the long-term is that a more export-oriented growth path will encourage increased productivity growth.

Exports can influence and contribute to higher growth and development through a variety of channels. The relative importance of these different channels seems to vary from country to country. The broad proposition that export-orientation encourages productivity and growth is now, however, very widely accepted.

Within the export sectors, increased productivity arises as existing factors of production are used more efficiently in response to external competition and the need to be cost-efficient. Through this mechanism, firms are forced to upgrade both capital and labor to compete in world markets. Indeed, competition through external trade is a very important link for the development of skills, and it helps producers to keep abreast of improvements in production techniques. This technological diffusion and transmission of ideas are important for continued growth and may even benefit non-exporting sectors. In addition, the larger size of the market may
make previously unfeasible economies of scale possible. Even in the absence of productivity gains in the export sectors, the economy as a whole may still benefit from gains in allocative efficiency both as resources move from less efficient to more efficient sectors, and as markets become more competitive.

Numerous empirical studies have shown the link between exports and growth. Higher export growth rates are associated with higher overall growth. While the actual mechanism differs across these studies (increased capacity utilization, scale economies, productivity and technological improvements and so on), there is widespread evidence in support of the phenomenon. The Newly Industrialized Countries (NICs) of Korea, Taiwan, Singapore, and Hong Kong are the most visible examples of countries that experienced export-led growth. The difficulties with an import-substitution policy are well documented. In countries that have followed development strategies based upon import substitution, growth, while often rapid in the early years of such policies, always withers later.

2. Trade Policy and Growth

Until the mid-1950s, South African trade and industrial policy appears for the most part to have followed the pattern typical of most emergent industrializing countries—the use of protection to encourage substitution of imports of consumer goods by local manufactures. As in many other countries, once this "easy phase" of import-substitution was completed, a choice arose -- how to proceed with industrial development. The successful East Asian industrializers chose outward-oriented policies, and used the capabilities that had been developed in the easy import-substitution phase as a basis for penetrating export markets in consumer goods industries. By contrast, South Africa chose to deepen import replacement in upstream industries. In 1951, the basic metals and chemicals subsectors accounted for 21 percent of the manufacturing capital stock; by 1971, this share had risen to 38 percent.

As Table 4.1 shows, between 1972 and 1983, basic metals and chemicals continued to be the most rapidly expanding sub-sectors of South African manufacturing. Yet by this time, the strategy of import substitution had largely been exhausted, even for upstream industries. Using the technique pioneered by Hollis Chenery the sources of demand growth are decomposed into three components: export expansion, import substitution, and domestic demand expansion. The results illustrate the limitations of orienting production solely towards the domestic market. From 1972-83, total output of the manufacturing sector expanded by 50.1 percent, owing mainly to an expansion of domestic demand on the order of 44.6 percent. The remaining output growth was accounted for in roughly equal measure by import substitution and export growth. From 1983-90, however, domestic demand expanded by a meager 1.6 percent. The engine of growth had run down.

2 See for example Krueger (1978), and Bhagwati (1978).

3 Chenery (1960).
Even in the face of international economic sanctions, export expansion began to provide a modest alternative source of growth in the 1980s. Table 4.1 shows that, had there been no export expansion, total manufacturing output would have declined by 1.7 percent. Nevertheless, because of the export effort, which accounted for 5.3 percentage points of total growth, manufacturing output increased by 3.5 percent.

South Africa's export base remains narrow, concentrated in upstream, capital-intensive activities. In 1988, basic metals and industrial chemicals alone accounted for 48% of all manufactures exports. Recently, there have been signs that South Africa's manufactures export base is beginning to become more diversified. Between 1988 and 1991, exports of "narrow" manufactures expanded at an average annual rate of 24 percent, with the expansion distributed widely across subsectors. Even in 1991, however, their share of manufactures exports remained below 30 percent.

The changing importance of manufacturing exports is reflected in its rising growth rate. Between 1972 and 1983 exports of manufactured goods grew at an average annual rate of 3.6 percent. Between 1984 and 1990, the growth rate increased to about 10 percent (all in real terms). For the period as a whole, while production grew 2.6 percent annually, exports increased at 6 percent annually. Consequently, the share of output exported grew from 7.2 percent in 1972 to 12.7 percent by 1990. This pattern of increasing (though still low) export orientation held in almost all sub-sectors (the only exception being in food products and printing and publishing).\(^5\) Faster growth in manufactured exports contributed to sizable current account surpluses in the mid- and late eighties. Four sub-sectors contributed approximately 70 percent of the growth in exports: basic metals and metal products (40.8 percent), chemicals (11.4 percent), textiles and wearing apparel (9.3 percent) and equipment (8.8 percent). Individually, the fastest growing sub-sectors were: furniture (20.4 percent) and wood products (13.1 percent), glass and glass products (14.5 percent), beverages (12 percent), though given their low initial bases, their export values are still small. A sub-period breakdown indicates little change in the sectors which have contributed the most to growth over the period. Except for wood and leather products, the rate of growth of exports in all sub-sectors was higher after 1983 (more than doubling in many cases), particularly in "non-traditional" sectors, such as the metal products and machinery sectors.

There is evidence, consistent with the outward-orientation approach, that export growth within the manufacturing sector has been associated with higher total factor productivity growth. Over the period, 1972-90, the TFP growth rate is strongly correlated with the amount of manufacturing output growth associated with export expansion (Table 4.2). The correlation is even stronger during 1983-90. In sharp contrast to these results,

\(^4\) These comprise electrical and non-electrical machinery and transport equipment, textiles, clothing and other consumer products.

\(^5\) The export growth rate is even faster if one excludes basic non-ferrous metals and chemicals industries which suffered from a glut on world markets and consequently, significant terms of trade losses.
TFP growth is only weakly and, in one case, negatively correlated with the amount of output growth accounted for by import substitution. It seems that, in manufacturing, outward-oriented policies are more likely to stimulate productivity growth than inward-looking ones.

There is further evidence that at least some of the causality behind the correlations runs from export to TFP growth. Granger causality tests have shown that during the country's import-substituting phase --up to the late sixties-- growth in merchandise exports did not generate manufacturing output growth (or indeed the other way around). The period from 1970-87, in contrast, when import-substitution had largely been exhausted and export incentives were improving, exhibited a strong bi-directional causality between both merchandise and total exports, and manufactured output. Exports are thus found to have been important in sustaining growth over recent years, or at least, in moderating its decline.

As shown in Chapter II, the latter half of the 1980s was a period of positive, if unspectacular, TFP growth. While this is consistent with the productivity-raising effects of faster export growth, it produces the question of why these effects were not larger. One answer is that during the late 1980s, although manufacturing exports grew rapidly, they still accounted for only a minor share of output -- 12 percent or less. This plausibly limited the impact of faster export growth on productivity. A further answer is that export growth during the late 1980s was not primarily

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Table 4.1: Sources of Industrial Growth, 1972-1990

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Output Expansion</th>
<th>Export Expansion</th>
<th>Import Substitution</th>
<th>Domestic Demand Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, Beverages &amp; Tobacco</td>
<td>56.3 16.4</td>
<td>1.3 2.9</td>
<td>0.4 -0.8</td>
<td>54.6 14.4</td>
</tr>
<tr>
<td>Textiles, Clothing &amp; Footwear</td>
<td>44.8 -8.8</td>
<td>5.2 -8.4</td>
<td>3.2 4.5</td>
<td>36.5 -5.0</td>
</tr>
<tr>
<td>Wood &amp; Wood Products</td>
<td>49.3 -10.8</td>
<td>4.5 -5.8</td>
<td>6.7 1.7</td>
<td>38.1 -6.6</td>
</tr>
<tr>
<td>Paper &amp; Paper Products</td>
<td>32.5 19.8</td>
<td>1.9 4.0</td>
<td>-1.7 -0.2</td>
<td>32.3 16.0</td>
</tr>
<tr>
<td>Chemicals</td>
<td>67.9 11.2</td>
<td>2.6 3.7</td>
<td>3.2 -8.7</td>
<td>62.2 16.3</td>
</tr>
<tr>
<td>Non-metallic Minerals</td>
<td>23.8 -0.8</td>
<td>-0.7 -5.8</td>
<td>0.5 1.7</td>
<td>24.0 3.3</td>
</tr>
<tr>
<td>Basic Metals</td>
<td>70.9 20.6</td>
<td>15.5 19.4</td>
<td>21.7 -1.3</td>
<td>33.7 2.5</td>
</tr>
<tr>
<td>Metal Products &amp; Equipment</td>
<td>42.7 -15.7</td>
<td>-0.2 -2.4</td>
<td>-0.5 6.1</td>
<td>40.8 -19.4</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>19.1 83.4</td>
<td>-2.0 30.7</td>
<td>-22.0 2.9</td>
<td>43.1 49.9</td>
</tr>
<tr>
<td>Total Manufacturing</td>
<td>50.1 3.5</td>
<td>2.5 5.3</td>
<td>3.0 -3.3</td>
<td>44.6 1.6</td>
</tr>
</tbody>
</table>


Table 4.2: Correlation Coefficients with TFP Growth Rates

<table>
<thead>
<tr>
<th></th>
<th>Output Expansion</th>
<th>Domestic Demand</th>
<th>Export Expansion</th>
<th>Import Substitution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972-83</td>
<td>0.192</td>
<td>0.098</td>
<td>0.245</td>
<td>0.107</td>
</tr>
<tr>
<td>1983-90</td>
<td>0.889</td>
<td>0.682</td>
<td>0.669</td>
<td>-0.571</td>
</tr>
<tr>
<td>1972-90</td>
<td>0.485</td>
<td>0.274</td>
<td>0.531</td>
<td>0.080</td>
</tr>
</tbody>
</table>

Source: World Bank Staff Estimates based on IDC data.
Note: Amount of percentage growth accounted for by each item. See Table 4.1

a process in which firms were investing and refining their production methods to improve competitiveness, but using spare capacity. The channels through which export growth impinges on productivity were partly inoperable.

Two important conclusions stand out from our analyses of the manufacturing sector (see Annex E). First, over the past two decades, export growth is positively correlated with productivity growth. Second, merchandise exports are highly sensitive to the level of the real effective exchange rate. Non-gold merchandise exports, and more importantly, manufactured exports, have responded very strongly to exchange rates. Periods of rapid export growth correspond to periods of low or declining exchange rates (see Figure 4.1). At the same time, other economies with long-standing import substitution policies, exports increase in times of low or declining domestic demand. This indicates that most investments were, and to a large extent still are, made primarily for the domestic market and are then exported, sometimes on a marginal cost basis, when domestic demand is at less than capacity output.

The empirical evidence strongly supports the vent for surplus hypothesis that the increase in exports shares was partly in response to declining domestic demand and accompanying low rates of capacity utilization. This explains much of the increase in export growth between 1984 and 1990. In the four industries in which capacity utilization fell the most -- beverages, other non-metals, electrical machinery, and other transportation-- export growth averaged 19.8 per cent annually. In contrast, exports averaged 13.3 per cent in the remaining sectors in which capacity utilization fell by only 2.9 percent across sub-periods. The econometric evidence confirms the hypothesis that the secular decline in output resulted in a substantial increase in manufactured exports. Faced with a drop in domestic sales, manufacturers were thus forced out into export markets. The estimated elasticity of export volume to domestic demand pressures (as proxied by the rate of capacity utilization) is 2.4 -- a high value\(^7\). Domestic

\(^7\) The elasticity is calculated as \(\beta(1-\alpha)\), where \(\alpha\) is the coefficient of the lagged export term and \(\beta\) is the estimated coefficient of the variable in question.
demand has a much stronger impact on exports than the other variables.\(^8\)

While vent for surplus provides the dominant explanation of export behavior, movements in the real exchange rate have been important. For example, significant depreciation of the rand after 1983 made South African exports more competitive and exporters responded to the change in relative prices (see Figure 4.1 and Annex E).\(^9\) This underlines the potential importance of exchange rate policy in the context of an outward-oriented approach.

World demand was not an important determinant of export growth. This is not surprising given that the bulk of the growth in South Africa's exports occurred in its traditional exports such as basic metals and chemicals, for which world demand was declining over the sample period. Consequently, any substantial long-term expansion in exports will require a reorientation of exports towards products with more rapidly growing markets. World demand, while not significant over the entire sample period, does have an impact after 1985, perhaps reflecting the effect of sanctions. There was a one-time drop in exports in 1976, perhaps related to the cancellation of export orders as a result of the social unrest that year.

At the same time, some sectors have been set up with significant export capacities because minimum efficient scales are larger than demand in the domestic market. Their export response is due to a combination of exchange rates, domestic demand and structural excess capacities. In addition, there has been a differential impact of sanctions on different categories of product which has led to differential export performance among sectors. Whatever the causes, exports and export shares in almost all tradable sectors have increased significantly after 1983 given both exchange rate depreciation and declining domestic demand. However, as recent export expansion has been partly driven by inadequate domestic demand and increased underutilization of capacity, it has not been accompanied by increased investment.

3. The Role of The Protection System in Promoting Inward-Orientation\(^{10}\)

It is generally more profitable in South Africa to produce for the domestic market than for exports. The analysis outlined here, suggests that this fact is heavily influenced by the structure of the trade protection system.

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8 To obtain the effect of changes in output on exports directly, we need to derive the effect of that output growth on capacity utilization i.e. \(\frac{\partial X}{\partial Y} = \frac{\partial X}{\partial \text{CU}} \cdot \frac{\partial \text{CU}}{\partial Y}\), where \(X\) \text{-- exports}, \(CU\) \text{-- capacity utilization}, \(Y\) \text{-- output}.

9 The estimated equation for manufactures in logarithmic form was as follows:

\[
X/Q = 10.9 + 0.32(X/Q) - 1.63\text{CU} - 0.43\text{REER} + 0.02\text{INTWD} - 0.11\text{DUM76}
\]

Adjusted \(R^2 = 0.93\)  

\(0.02\text{INTWD} - 0.11\text{DUM76} \quad (1.73) \quad (2.04)\)

D.W. = 2.12

where \(X/Q\) is the share of gross output exported, \(CU\) is an economy-wide indicator of capacity utilization, \(\text{REER}\) is the real effective exchange rate, \(\text{INTWD}\) is an interaction term calculated as the product of a post-1985 period dummy variable that takes the value of 1 for the period 1985-90, and zero for other years, and an index of world exports, and \(\text{DUM76}\) is a one period dummy for 1976 (1 is 1976, 0 otherwise).

10 This section draws heavily on the analysis in Belli and others (1993).
Although export subsidies mitigate the effects of protection, anti-export bias nevertheless dominates.

One important characteristic of the trade regime over time in South Africa has been the extreme specificity of protection and export incentives. Such a system is designed on a case-by-case basis. With respect to protection, it is almost impossible to determine from existing data which industries receive benefits, the dates on which they received them, or the magnitudes involved. Our view is that the degree of protection has tended to accommodate to the wishes of domestic producers, thus creating a very complex system and increasing inward orientation. Although the Government, through a series of commissions, has emphasized the need to use trade policy to move the economy towards a more export-oriented and open structure, the need to protect existing industries and utilize domestic resources as inputs has interfered with these objectives.

South Africa has a complex protection system with a number of different instruments. These include: quantitative restrictions (QRs), customs duties, and import surcharges. Trade policy in South Africa has aimed primarily at supporting import substitution since the late 1920s. Its general emphasis has been on ensuring "moderate and selective protection" for firms supplying a "substantial" share of the domestic market against "normally" priced imports. Up to 1972, a substantial portion of protection was supplied through quantitative restrictions (QR). In that year, the authorities
began to substitute tariffs for QRs--a process that accelerated towards the middle of the decade--and introduced an "Export Development Assistance" scheme to spur exports.\footnote{Reyners Commission Report.} This scheme involved a tax allowance for marketing expenses incurred in connection with export efforts. The main effect of the protection regime, however, was to make producing for the domestic market vastly more profitable than producing for exports.

Starting in 1980 the authorities introduced a new, more powerful system of export incentives.\footnote{In response to the recommendations of the van Huysteen Committee.} The process of eliminating QRs accelerated after 1983, and at the same time the authorities liberalized the market for foreign exchange by merging the financial and commercial rand, effectively abolishing exchange rate controls on non-residents (although the financial rand was re-introduced in 1985 after the imposition of financial sanctions). The substitution of tariffs for QRs, moreover, involved some liberalization because the new tariff levels were lower than the tariffs implicit in the QRs.\footnote{The proportion of the value of imports subject to QRs was reduced from 77 percent in 1983 to 55 percent in 1984, to 23 percent in 1985 (the proportion of tariff items subject to QRs was reduced to 28 percent) and tariffs were raised to compensate for the elimination of QRs. See Bell (1992).} The authorities also relaxed import permits by switching from a positive list (specifying the goods subject to import permits) to a negative list (specifying the goods that did not require an import permit). Further relaxation of QRs has continued since 1985 and the proportion of tariff items subject to QRs is now around 20 percent (mainly on agricultural goods and textiles). Tariffs are now the main instrument of protection.

Despite the substantial liberalization of the trade regime in the past decade, serious problems remain. First, the system is subject to excessively frequent changes. Second, the tariff structure is over complex. Third, the dispersion of the tariff schedule is exceedingly high. Fourth, the regime is biased against exports. The system will be overhauled under South Africa's recent agreement with GATT to reform trade policy by 1999; first steps in this direction are now under review. Each of the three problems is discussed here and explored in further detail in Annex D.

Tariffs change frequently because they are set on a day-to-day basis in response to requests from the private sector. It is relatively easy to obtain changes in protection and the private sector has taken full advantage of the opportunities to influence Government policy. Due to these frequent changes, the plethora of rates, and the intricate manner in which tariffs are levied, South Africa's tariff structure is one of the most complex in the world. Some rates are ad valorem, some are specific, some are levied according to complex formulae, while others combine specific and ad valorem elements.

Many exemptions are granted on a firm-by-firm basis, rendering the tariff importer-specific rather than product-specific. Import levies include ordinary customs duties and import surcharges. The former can be ad valorem, specific or a combination of both; the latter are imposed on a subset of goods and are generally ad valorem, except for fuels. There
is also a fuel levy on petroleum and petroleum products, and anti-dumping duties on a limited number of products. South Africa’s tariff schedule is especially intricate when compared to that of other countries: it has more tariff rates, a wider range of tariffs, and a higher coefficient of variation (ratio of standard deviation to the mean) of tariffs than most other countries.

The complex tariff structure also has a wide dispersion. While a comparatively large proportion of items are zero-rated, a high proportion have high rates. In fact, South Africa’s highest tariff is not only the highest in a sample of 30 developing countries for which the Bank has comparable data, but more than twice that of its closest competitor’s -- Egypt’s 600 percent. The number of high rates, combined with the high number of low rates yields a coefficient of variation second only to Nepal’s. From the point of view of the average statutory tariff (weighted by the value of imports), South Africa is not an over-protected country.\textsuperscript{14/15} The average statutory tariff is 27.5 percent, placing South Africa just above the median in the sample. In fact, with the exception of mining products in which South Africa’s tariff is among the lowest in the world, the average statutory tariff is about average or below most developing countries. Compared to developed countries (GATT treats South Africa as a developed country), however, South Africa is a highly protected economy, with an average duty rate twice as high as New Zealand’s, the country with the next highest average tariff.

In conclusion, tariff-based protection in South Africa while about average for developing countries, is extremely high by developed country standards. The main problem is not the overall rate, but the dispersion, undue complexity, and instability of the system. The sectoral incidence of nominal protection is uneven. Tariff-based protection, intentionally or unintentionally, protects manufacturing more than agriculture and the latter more than mining. Within manufacturing, consumer goods are more protected than capital goods, and the latter more than intermediate goods (see Table 4.3).

The textiles, apparel and leather subsector is clearly the most protected of all subsectors: the average rate is the highest, the maximum rate applicable to the sector is the highest of the entire economy, and the coefficient of variation is lower than for the economy as a whole, indicating that protection is not only higher, but consistently higher than

\textsuperscript{14} A word of warning about the data. Formula duties and specific duties present a problem of valuation and comparison. By definition, specific duties are levied on the weight, number, or volume of a good. The rate of duty with respect to the value of the good is likely to differ with each shipment. The formula duties, on the other hand, do not entail a single rate of protection, but depend critically on the relationship between the reference price and the actual price of the good. To calculate rates and make comparisons possible, the South African authorities provided an \textit{ad valorem} equivalent of both formula duties and specific duties. The resulting rates, however, are subjective and depend on the assumed reference price.

\textsuperscript{15} The present analysis is based on the 1989, 1990 and 1991 tariff schedules. Because of the frequent changes in the tariff schedule, any analysis of the South African trade regime is a snapshot valid for only a short time. In 1990 the schedule consisted of 13,609 items of which 1,791 items showed no imports, although the items in question could have been imported duty-free. Most of these items were catch-all categories ("not included elsewhere") for items that otherwise elude description.
Table 4.3: Nominal Rates of Protection

<table>
<thead>
<tr>
<th></th>
<th>Weighted Mean</th>
<th>Unweighted Mean</th>
<th>Minimum Rate</th>
<th>Maximum Rate</th>
<th>Coefficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Economy</td>
<td>28</td>
<td>29</td>
<td>0</td>
<td>1,389</td>
<td>159.8</td>
</tr>
<tr>
<td>Agriculture</td>
<td>23</td>
<td>16</td>
<td>0</td>
<td>147</td>
<td>144.9</td>
</tr>
<tr>
<td>Mining</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>20</td>
<td>186.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>28</td>
<td>30</td>
<td>0</td>
<td>1,389</td>
<td>158.4</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>60</td>
<td>48</td>
<td>0</td>
<td>1,389</td>
<td>125.5</td>
</tr>
<tr>
<td>Intermediate Goods</td>
<td>17</td>
<td>18</td>
<td>0</td>
<td>1,320</td>
<td>198.9</td>
</tr>
<tr>
<td>Capital Goods</td>
<td>19</td>
<td>17</td>
<td>0</td>
<td>135</td>
<td>103.5</td>
</tr>
</tbody>
</table>


for the rest of the economy. The non-metallic minerals subsector is the second most protected, with the highest weighted average tariff, second highest unweighted average tariff, second highest maximum rate, and the highest coefficient of variation. These results hold broadly, whether weighted (as in the discussion here) or when unweighted statutory tariffs, or tariff collection ratios are used.

Effective Protection

Nominal rates of protection give only a partial (sometimes distorted) view of the effects of the trade regime. QRs may increase the price of a product in the domestic market far above what the tariff alone would allow. But domestic competition may decrease the price below what the tariff would allow. Finally, even in the absence of QRs, the effect of the tariff on value-added depends on the relationship between the tariff on outputs and the tariff on inputs. The whole purpose of protection is to increase the value-added in the protected activities by increasing the price of the protected output. If, however, the tariff on inputs is higher than the tariff on output, the net effect may be to reduce value-added relative to a free-trade situation. In South Africa, where tariffs are levied on both inputs and output, and where protection is granted virtually on demand, nominal protection on a particular product does not necessarily mean that the producing firm's value-added is higher as a result. Protection on the output of a particular firm may be neutralized by the higher costs that the firm may incur on account of the higher prices that it must pay for its inputs. For these reasons, a measure of effective protection is essential to ascertaining the net impact of trade policies and domestic market conditions on the value-added in production. The effective rate of protection is designed to capture the effect by comparing the percentage difference in value-added between actual and hypothetical free-trade conditions.
The Industrial Development Corporation of South Africa (IDC) conducted an effective protection study of the South African trade regime using 1989 data. The study assumed that firms set their prices up to the limit allowed by the tariff. From information gathered by the World Bank through firm-level interviews, this assumption appears realistic. The IDC study shows that on average, protection on inputs was about 13 percent, while protection on output was about 18 percent and effective protection on the order of 30 percent, indicating that value-added is 30 percent higher than it would be under free-trade conditions. Of course, there are marked variations in protection between and within product categories, with protection on output (for subsectors, not individual products) reaching as high as 84 percent and as low as zero, while protection on inputs reaching as high as 87 percent and as low as zero. These ranges were calculated at the 4-digit ISIC level and therefore mask wider variations that occur at the product-specific level. A summary of the results (2-digit ISIC level) appears in Table 4.4.

Trade policies have succeeded in increasing value-added as compared to a free-trade situation (for every manufacturing sub-sector at the 2-digit level of aggregation, not necessarily for every firm in the economy). The textiles, apparel and leather sub-sector enjoys the highest rate of effective protection, with three times the average for the manufacturing sector; its value-added is nearly double what it would be under free-trade conditions. The metal products subsector appears at the other end of the spectrum, with effective protection of only 20 percent. The variations at the 4-digit level of detail are even more pronounced, with effective protection rates ranging from -21 percent for meat processing to 421 percent for pottery, china and earthenware. It is indicative of the thrust of trade policy that effective protection rates vary from negative to positive for closely related industries, according to the degree of

### Table 4.4: Estimates of Effective Protection (percentages)

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Protection on Inputs</th>
<th>Protection on Output</th>
<th>Effective Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, Beverages and Tobacco</td>
<td>15.2</td>
<td>13.7</td>
<td>8.8</td>
</tr>
<tr>
<td>Textiles, Apparel &amp; Leather</td>
<td>27.8</td>
<td>43.6</td>
<td>93.6</td>
</tr>
<tr>
<td>Wood &amp; Wood Products</td>
<td>14.0</td>
<td>21.7</td>
<td>39.7</td>
</tr>
<tr>
<td>Paper &amp; Paper Products</td>
<td>9.5</td>
<td>13.3</td>
<td>22.2</td>
</tr>
<tr>
<td>Chemicals</td>
<td>7.5</td>
<td>18.9</td>
<td>50.6</td>
</tr>
<tr>
<td>Non Metallic Minerals</td>
<td>5.2</td>
<td>19.8</td>
<td>34.3</td>
</tr>
<tr>
<td>Basic Metal</td>
<td>4.7</td>
<td>11.2</td>
<td>23.2</td>
</tr>
<tr>
<td>Metal Products &amp; Equipment</td>
<td>17.1</td>
<td>18.2</td>
<td>20.3</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>2.8</td>
<td>10.9</td>
<td>62.8</td>
</tr>
<tr>
<td>Total Manufacturing</td>
<td>12.6</td>
<td>17.8</td>
<td>30.2</td>
</tr>
</tbody>
</table>

Source: Onderzoek Na Die Tariefbeskermings beleid. Ontheleding van die Tariefstruktuur. IDC, June 1990.
processing; -21 percent for grain mill products versus 139 percent for bakery products and -26 percent for wool and cotton finishing compared to 94 percent for spinning and weaving of textiles. This feature reveals a clear tendency towards the promotion of increasing local value-added, in accordance with stated policy objectives of beneficiation. The mining sector, that sells mostly abroad, receives no protection in the domestic market. Nevertheless, mining firms buy their inputs from other firms that receive protection and consequently pay more for those inputs than under free-trade conditions. As a result, effective protection for the mining industry is negative, in fact its value-added is lower than under free-trade conditions.

**Anti-Export-Bias.**

Protection inevitably introduces an anti-export bias on two counts. First, it makes sales at home more lucrative than sales abroad by allowing firms to raise prices in the domestic market above those that would prevail under free-trade conditions. Second, it makes exporting firms less competitive internationally by increasing the cost of their inputs, hence their costs of production. There are several ways to counteract the policy-induced anti-export bias. Effective duty drawback schemes, export-processing zones, and subsidies, are among the most commonly-used instruments. South Africa has put some of these instruments in place to counteract the negative effects of protection on exports, but they are not commonly used and their effectiveness is doubtful. As a result, the policies in place tend to make production for the domestic market far more profitable than production for export. Unlike some export-oriented Asian countries where such differences also exist, but where important advantages to exporting are not fully captured in price differentials (because of hidden and not so hidden subsidies, sanctions against poor performers, and so on), prices in South Africa capture the full economic advantages of exporting.

Five main export incentives are currently in place in South Africa:
- The General Export Incentive Scheme (GEIS);
- Customs duties drawbacks and exemptions from customs duties;
- Exporters' allowances;
- Other incentives; and
- Sector-specific export incentives.

These are further discussed in Annex D. We focus on one here -- the GEIS-- as a general illustration of the need to offset the anti-export bias.

**The General Export Incentive Scheme (GEIS).**

This is the major export incentive scheme in place and dates back to April 1990. GEIS was designed to help firms offset the price disadvantage South African exporters face in international markets. According to a study undertaken by the South African Chamber of Business (SACOB), South African manufacturing costs are 15 percent higher than the OECD average mainly because South African manufacturing firms pay 24 percent more than their OECD counterparts for their inputs, but also because their capital and productivity-adjusted labor costs are higher.16

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GEIS provides a tax-free financial subsidy to exporters based on the value of exports, the degree of processing and the local content of the exported product.

Under GEIS, exports fall into one of four categories: primary products (like logs or mineral products), beneficiated primary products, that is, products with some degree of processing (for example, saw logs, billets), material-intensive products (for example, planed planks, sheet metal), and manufactured products (for example, furniture, steel cabinets). The export subsidy increases with the level of beneficiation (processing), the level of local content, and with the value of the rand against a basket of currencies. The subsidy applies to most exports. About R800 million was budgeted for GEIS payments the first year. By March 1992 GEIS payments were running at R2 billion per year. Because GEIS increases in proportion to the percentage of local content, exporters must choose between the duty drawback scheme or GEIS. Not one of the companies interviewed in connection with this study used the drawback system; most took advantage of GEIS.

What is the net effect of these policies on export incentives? The anti-export bias coefficient is a measure commonly used to compare the effects of domestic policy on incentives to export. This coefficient indicates the extent to which policies increase value-added in production for the domestic market compared with the extent to which policies increase value-added in production for exports (in relation to hypothetical free-trade conditions). If policies raise value-added for domestic production more than for export, the anti-export bias coefficient is greater than one. If policies render exports more attractive than domestic production, the anti-export bias coefficient is less than one. If policies are neutral, then the coefficient is exactly one. In the rare cases where value-added for either domestic or export production is negative, the coefficient is negative.

The results from an examination of anti-export bias coefficients for a sample of firms point to a policy-induced anti-export bias mitigated by arrangements between South African suppliers of inputs and exporters. The results also indicate that GEIS is crucial to stimulating exports, although, given well-founded uncertainties about its continuity, its role in stimulating investment in export activities has been questionable.

For the manufacturing sector as a whole, protection on inputs raises their cost by 12.6 percent, compared to a free-trade situation. In sales for the domestic market, higher input costs are offset by higher output prices (on average 17.8 percent higher than under hypothetical free-trade conditions). Exports, however, must be sold at world prices less transport costs. Higher input costs mean lower profits and lower value-added.

GEIS, however, is the key to making exports profitable. On average GEIS represents about 8.4 percent of the value of output, but because GEIS is a tax-free subsidy, its value for the firm must be adjusted by the firms' marginal tax rate. In 1991, the corporate marginal tax rate was 50 percent, which meant that the taxable equivalent of GEIS was 16.8 percent, on average. This additional revenue increases value-added in exports by an amount, estimated at about 83.9
percent in 1991. Without GEIS, value-added in domestic sales would have been 88.6 percent higher than in exports; with GEIS the difference was a negligible 2.5 percent. It is doubtful that South Africa could sustain the present level of manufactured exports without GEIS.

As a result of the tremendous dispersion in nominal protection and of GEIS, the effects of policy on the different subsectors are very disparate. The anti-export bias coefficient ranges from a high of 1.64 (textiles) to a low of 0.70 (paper and paper products). Textiles illustrate the effects of present policies. Protection on inputs varies according to the subsector, from 17 percent to 84 percent, while protection on output ranges from 9 percent to 87 percent. Effective protection ranges from a low of -26.1 percent to a high of 239.3 percent. As a percent of the value of exports, GEIS ranges from a low of 1.19 percent to a high of 19.1 percent. GEIS is not related to protection inputs or to the degree of effective protection in the domestic market. As a result, out of nine subsectors in textiles, policies are pro-export biased in two cases, anti-export biased in five cases, and extremely anti-export biased in two cases.
The aim of the World Bank’s program of Economic and Sector Work in South Africa is to advise upon a process of reviving economic growth and enabling a substantial and ongoing process of redistribution, here defined in the broadest welfare sense as a redistribution of income and a redistribution of access to publicly-provided services and facilities. We assume that a future government will have three central aims:

- to re-establish growth in both living standards and per-capita GDP;
- to reduce unemployment, particularly among blacks; and,
- to narrow inequalities in the distribution of income and access to public services.

Designing an appropriate policy framework must balance those features of the economy that present advantages and disadvantages. The task is to construct the framework to maximize the benefit from economic features that facilitate the achievement of the policy objectives, and to minimize the importance of these features that present obstacles. The emphasis here is on the medium-term, although some short-term issues of economic management are addressed.

1. Key Features

Three positive features of South Africa’s present position should be exploited as far as possible. When taken together, these raise the possibility of an impressive growth revival with a sustainable balance-of-payments position.

First, as the country is in a deep recession, a revival of the economy would enable rapid growth over the early years of a new administration. Real GDP could be raised by as much as 7 percent with a level of investment only just sufficient to maintain existing levels of the capital stock.

Second, high levels of public investment have left South Africa with substantial underutilization in some of its infrastructure and its power-generating utilities. The country has the considerable advantage that little new investment will be needed over the coming years in substantial parts of the transport and communication system and in electricity generation.

Third, if foreign finance can be secured, then a faster growth path could be financed by external sources, and a sustainable long-term external position could be maintained. As a consequence of the imposition of financial sanctions, South Africa has an unusually low foreign debt-to-GDP ratio. South Africa is not in the foreign-debt trap faced by some countries in Latin America and Eastern Europe. The savings rate out of private disposable income has been unusually high -- 22 percent in 1990. Thus, if dissaving by the public sector can be controlled, South Africa
has the potential to maintain a high level of investment relative to GDP within the confines of a sustainable balance-of-payments position.

But these positive features of the present situation are offset by a number of obstacles to faster growth in output and employment. It is worth bringing these together.

* a capital-intensive production structure partly created by government policy;
* a system of incentives that has created an inward-looking industrial sector;
* an undertrained and undereducated labor force;
* an urban structure that inhibits the productivity of unskilled labor and is not conducive to the growth of the informal sector and;
* the significant industrial conflict that has grown over the 1980s.

While these clearly present formidable obstacles to future development, the task ahead is further complicated by some additional features of the present situation. Perhaps the most important of these is a general lack of investor confidence, at home and abroad. This principally arises from uncertainties regarding the political future and the present atmosphere of rising violence and social unrest. Such uncertainties exacerbate the current recession. However, even if confidence were at a higher level, the authorities could be constrained in their actions by a lack of external inflow through the capital account of the balance of payments. Although many sanctions have been lifted, political uncertainties continue to constrain access to foreign capital. In the absence of external inflows, a serious attempt to revive the economy through a further expansion of public expenditure, would quickly weaken the overall balance-of-payments position, and lead to a depreciation in the value of the rand with a possible resurgence in inflation. The authorities, with the support of major political parties, have recently negotiated final arrangements regarding the foreign debt affected by the 1985 standstill.

2. Outline of a Policy Framework

In designing this framework, we have made two critical assumptions. First, that the successful completion of ongoing negotiations will lead to a new, more democratically-based government. In the present atmosphere of violence, distrust and suspicion, it is difficult to see any positive way forward for the South African economy. Second, that the formation of an internationally-acceptable government will loosen South Africa's external capital constraint. A number of multinational corporations have expressed interest in investing in South Africa when "the time is right." It is possible that some of these companies will move funds into the country when a new government is formed, although it is likely that they will move cautiously at first. The establishment of an internationally-acceptable government is also likely to open the door to a renewal of financial support from the International Monetary Fund and the World Bank. In addition, new sources of funding are likely to be opened by other multilateral-lending institutions. A re-opening of multilateral support should have a further catalytic effect upon foreign commercial banks. This is particularly important, as the
international banking community is likely to be the largest single source of international credit. Although concessional aid from unilateral donors will provide a cheap source of foreign finance, there is great uncertainty regarding the magnitude of such support.

**Main Elements**

The basic strategy may be broken into these major components:

- Encourage rapid growth in skilled labor by upgrading the skills of semi-skilled and unskilled workers.
- Encourage a shift in the orientation of the manufacturing sector towards exports.
- Stimulate employment growth through rural restructuring and encouraging small businesses.
- Restructure government expenditure by: raising public investment in infrastructure and public services, and targeting this towards the poor and underprivileged; and simultaneously restricting the growth of recurrent expenditure so as to meet budgetary targets.
- Observe sustainable fiscal targets, and maintain a monetary policy consistent with a stable inflation rate.

The top boxes in Figure 5.1 list the main policy objectives. We believe that, in addition to its direct impact on these objectives, the policy framework must also satisfy three intermediate requirements: a private sector investment revival; social stability; and maintenance of stable inflation and a sustainable balance-of-payments position. The importance of the intermediate requirements is best explained by considering what happens if they are not met. **Private investment** has much higher productivity and historically, has created more new productive jobs than investment by the public sector. An increase in private investment is a critical constraint upon the economy's ability to generate sufficient demand to counteract recessionary tendencies. A failure to revive private investment would thus put severe limits on future growth. **Social stability** is perhaps the most critical requirement. A continuation of existing social tensions would totally undermine attempts to revive private sector confidence, and would make it very difficult to maintain stable economic policies. No economic program in South Africa can succeed unless it is accompanied by increasing social stability. If gains from growth are not perceived as being distributed equitably by the community at large, social unrest will reemerge, and political and economic stability will be undermined. **Stable inflation and a sustainable balance-of-payments position** are also essential. An increase in inflation would raise social discontent, as historical evidence indicates that the prices of goods consumed by the poor tend to be the first to rise, while serious balance-of-payments problems would force the government to restrain growth through contractionary measures.

Policies are represented in the bottom row of Figure 5.1. Their arrangement along the row does not signify relative priorities. In our view, it is essential that progress be made simultaneously in the policy directions indicated. The various routes taken by the suggested policies in reaching the objectives are described here.
Figure 5.1: A POLICY FRAMEWORK

- Objective: Faster Economic Growth
- Objective: More Employment
- Objective: Redistribution of Welfare
- Requirement: Revival of Private Investment
- Requirement: Social Stability
- Requirement: Stable Inflation and External Position
- Policy: Encourage Growth in Skills
- Policy: Export Promotion
- Policy: Rural Restructuring, Small Businesses
- Policy: Increased Public Investment
- Policy: Prudent Fiscal, Monetary
Skilled labor expansion is an important prerequisite for faster growth, and should be redistributional. In the past, a scarcity of skilled labor has acted as a brake on economic growth, and this is once again likely to re-emerge as an important constraint as the economy comes out of the present recession. The inadequacy of South Africa’s skills base is hardly surprising, as past policies ensured that high-quality education and training were only for the white population. Faster economic growth will clearly require a more rapid expansion of the skills base that will encompass all racial groups. The evidence presented in Chapter 3 suggests that this would stimulate much higher employment growth among the skilled, as any negative effects on unskilled employment arising from the substitution of skilled for unskilled labor would be heavily offset by the beneficial effects of higher growth in the economy. To achieve a sufficiently rapid skills expansion, the quality of black education should be improved, and existing unskilled workers will need to be trained.

A sufficiently rapid expansion in the skill base will have consequences for the labor market that should be redistributional. First, the employment of unskilled black workers will increase. This should raise the incomes of many poor households. Second, unskilled workers who receive additional training will experience substantial wage increases with similar redistributive effects. Third, the wages of skilled (mostly white) workers will rise less quickly as the skills expansion will ensure that skilled workers are more plentiful. The net effect of all three effects should be a narrowing of the income differential between the semi-rich and the semi-poor.

The econometric evidence described in Annex A suggests that a rapid expansion of skilled labor would counteract some of the inflationary pressure that will otherwise build up as the economy moves back to full capacity. In the past, the wages of white workers have been bid up more rapidly during economic upturns, and this, perhaps bolstered by intensified ‘catching-up’ pressure on the part of black wages, led producers to raise their prices. With a more abundant supply of skilled labor, this upward pressure on prices should be considerably reduced.

A reorientation of the private sector towards exports should provide both a consistent source of aggregate demand and promote growth through greater efficiency in production. The impact is thus shown only towards faster growth. The economy has been mainly driven by domestic demand in the past, and has been increasingly susceptible to problems of demand insufficiency since the early 1970s. Greater involvement in overseas markets will help to break this constraint. Long-term sustainable growth will, however, require increased efficiency, and an export-oriented growth path will help to achieve this. Such a path is likely to be associated with increased productivity within the exporting sectors and elsewhere in the economy.

Job creation through rural restructuring and encouragement for small businesses would serve primarily to provide more jobs, and would certainly be consistent with greater social stability. These measures will directly improve the welfare of the disadvantaged population. In an economy in which 25 percent or so of the labor force is unemployed and in which nearly one half do not have wage employment, the social cost of
employing labor lies well below going wage rates. In such circumstances, affordable special employment measures are justified.

**Increased public investment** would directly serve the redistributive objective and contribute to improved social stability. The immediate needs of the disadvantaged majority in South Africa are best served by an increase in public investment in urban infrastructure such as water supply, sanitation and housing in deprived areas, and in further provision of schools and facilities for primary health care. These expenditures would be very different in their distributional effect from much previous public investment, as the latter was largely aimed at providing infrastructure and services that benefitted the white community. Such investments should, in the presence of greater private investor confidence, generate sufficient upward multiplier effects to drive the economy back towards full capacity.

**Prudent fiscal and monetary policies** are needed to ensure the internal and external stability of the framework. They are in a real sense the watchdog of the process. A runaway fiscal deficit will inevitably lead to increased inflation and balance-of-payments problems. Irresponsible monetary policies will have similar effects, and could lead to hyperinflation.

No economic policy framework can succeed unless it is conducted in an atmosphere of transparency, stability and credibility. To stimulate growth, the single most important ingredient is investor confidence. Political and economic uncertainties are powerful disincentives. Investor confidence will only materialize if policymaking is transparent, and there is a stable set of policies.

### 3. Policies

**Expansion of Skills**

The provision of education and training in South Africa is inadequate on both distributional grounds and in terms of future growth needs. Greater emphasis has been placed in recent government budgets on reallocating expenditure towards education, and it can be expected that this trend will continue under a new administration. At present, there are 19 separate education departments within South Africa, and clearly, this will need to be rationalized before a coherent educational strategy can emerge. However, investment in education on a much broader basis than in the past should provide good social returns, and be consistent with higher long-run growth. It will be particularly important to ensure that the quality of education received by the children of disadvantaged groups be improved, while paying careful attention to the appropriate balance between technical and general education at higher levels.

As South Africa sets about establishing a unified education system to provide high quality education to all its citizens, it confronts a daunting challenge of inadequate access, low quality, inequitable and inefficient allocation of resources, and poor planning and management capacity, all linked to the policies of apartheid. While education is compulsory for whites and Indians through 16 years of age, it is not for Africans. And while whites and Indians receive a first-world education, Africans are subjected to an education system in many ways far inferior to that in African countries with much lower per capita income. Resource allocation is neither prioritized nor equitable.
Education planning is either haphazard or nonexistent, while management capacity (especially in the problem-ridden African education departments) is extremely weak.

According to recent data, 10.3 million out of an estimated 11.9 million children aged between 5 - 17 years were enrolled in school. All children out of school are Africans. Some estimates suggest the figure for unenrolled youngsters to be considerably larger, up to 2.5 million. Even for those Africans who are in school, the serious shortage of classrooms means severe overcrowding. Under such conditions, little learning takes place and many children repeat, drop out and re-enter the education system haphazardly. These problems are compounded by the destruction of the culture of learning -- the legacy of the highly politicized atmosphere that has dominated South African education since the 1976 Soweto uprising.

Inequality also manifests itself in other ways. Among African schools conditions are at their worst in the homelands. In Transkei, KwaZulu and Gazankulu, it is common for 100 pupils to be huddled in a classroom designed for 40. Urban areas fare generally better than rural, although there are no school facilities in the new informal settlements around the major urban conurbations. In many rural areas, there are no secondary schools.

The quality of African education continues to be plagued by low standards, a hostile learning environment, and cultural biases. Bantu education, introduced in 1954, was designed to thwart the intellectual development of African children and to limit their economic participation to physical menial tasks. Poor academic results attest to the low quality of African education. Of every 10,000 African children who enter school, 1,400 will reach matriculation; 113 will pass matriculation, 27 will gain university entrance, and only one will get a university-level entrance pass in math and science.

Even for those African children who manage to stay on in school, learning achievements in the core subjects, mathematics, science and English, are extremely low. Large classes and poor learning environment play a part; teachers are ineffective because of poor training, inefficient because of lack of administrative support, and demotivated because of the lack of adequate teaching materials and the destruction of the culture of learning. In African education the language of instruction poses a formidable obstacle. It is not uncommon for an African child to reach school-age speaking only his or her ethnic language, be taught in the first three years of education in a second language, switch to English as a medium of instruction at standard four, and be forced to learn Afrikaans simultaneously.

Yet another major problem is the lack of planning and management capacity. In all the education departments, there are important skills gaps especially in policy analysis, monitoring and evaluation, management information systems, planning and budgeting linkages and management for change. Moreover, whatever skills exist are unevenly distributed quantitatively and qualitatively. Thus, the least needy systems have the most skills, while the most needy, the self-governing territories (SGTs), have a dearth of planning and management capacity.
A consensus is emerging among the major political groups on the need to: provide, largely at state expense, good quality basic and junior secondary education to all children; integrate the existing 19 education departments into a single system; and decentralize education to the regions to enhance management efficiency. Implementation of these programs will be essential if the skills base is to grow at a satisfactory rate.

Box 5.1 Importance of Basic Education

The importance of basic education is supported by evidence from Southeast Asia, where investment in basic education is pivotal in spurring economic growth and reducing poverty. International experience shows that much of the responsibility for addressing issues such as technical and vocational training, adult education, and numeracy/basic skills acquisition should rest outside the public sector. By concentrating government effort on basic education, the strategy is to lay a solid foundation upon which the rest of the system can be built. It makes little sense to implement major reforms and investment at higher levels of the system while the lower levels continue to churn out huge numbers of people with low levels of cognitive skills. But in the interim it is important to maintain quality.

Returns from education will take years to emerge. Given the need for economic growth to resume as quickly as possible, the skills of the labor force should be more quickly upgraded through training. At present, national training seems to be appallingly inadequate. Only about 9,000 apprentices were newly-indentured during 1990, of whom 6,700 were whites, while the number of apprentices has not increased during the 1980s. While 280,000 individuals were trained on various public and private training courses during 1990, much of this training was provided on courses of a very short-term duration -- one week or less.

A serious upgrading of the skill base can only come about through the efforts of the private sector. It seems unlikely that adequate training subsidies or a large-scale expansion of public training facilities can be easily afforded given budgetary constraints, although efforts are now underway at the Department of Manpower to expand public training. This would in any case benefit from the participation of the private sector. In addition, while intensified demand pressure may cause employers to provide more training, this is likely to be geared to the short-term needs of the firm and may be of limited social value. As it is clearly difficult for blacks to finance their own training costs, further incentives must be perceived by employers.

The solution could come through a pact between major employers and trade unions, under which the employers would agree to upgrade workers through providing training in widely-applicable skills, and the trade unions would agree to limits on strikes and other activities. Here, some comfort may be drawn from the experience of the Scandinavian countries, and there is encouragement from the establishment of the National Economic Forum. A central point here is that industrial relations' problems have become a major impediment to industrial development, and a pact should have the additional effect of further
encouraging a revival in private sector investment. It is encouraging to see that ideas along these general lines are being considered by some major trade unions.

Reorientation Towards Exports

Although in the short-run South Africa’s manufacturing sector may be able to sustain its present growth in exports, in the medium-to-long term, export growth will inevitably require expansion of capacity. This will take place only if the private sector has both a clear idea of the direction of policy and confidence in the Government’s commitment to its policy framework. If South Africa wishes to stimulate investment in export activities, the Government should articulate a strategy for the external sector, while allowing sufficient time for the private sector to make the necessary adjustments. Such a strategy might include the following elements: a commitment to export-led growth; a strategy to offset the anti-export bias associated with continued import protection; a strategy to encourage small and medium-sized firms that now produce exclusively for the domestic market to explore export opportunities; and a plan for rationalizing the tariff schedule and gradually reducing protection. There is undoubtedly substantial scope for export of services. This is particularly true of tourism and perhaps financial services. Both of these sectors could benefit when present uncertainties are resolved.

South Africa’s most urgent task in international trade is to take the initial steps to address the anti-export bias inherent in its trade policies. The analysis conducted by SACOB, highlights the urgency of this step. The SACOB study indicated that two-thirds of the disadvantage that South African exporters suffer (relative to foreign competitors) stems from the higher prices that they pay for manufactured inputs. Ideally, trade policies should eliminate this disadvantage, and place exporters in a position of indifference between selling at home or selling abroad. The experience of East Asian exporters suggests that trade policies should be biased in favor of exports. At a minimum, however, trade policies should be neutral.

There is no doubt that export neutrality is easier to achieve within totally free-trade. Perhaps for this reason, in South Africa, export neutrality has often been inextricably associated with import liberalization. The two terms, however, are not equivalent, and it is possible to achieve export neutrality while maintaining protection for the domestic market. To achieve export neutrality, two separate tasks need to be undertaken. First, all exporters must have free access to imported inputs. Second, incentives to export must be brought closer in line with incentives to produce for the domestic market. An important step towards export neutrality can be taken by putting in place mechanisms that make it possible for exporters to have access to high quality inputs at world prices. These mechanisms require some liberalization (for export, sales), but not necessarily a reduction of protection within the domestic market. This does not imply that no changes in the import tariff structure are warranted. The review of import duties in Chapter IV identified three main problems: unevenness in the duty schedule; an unduly complicated tariff structure; and a highly fluid tariff schedule. These problems need to be addressed quickly.

The average import duty rate is not high by developing country standards. While a lower average duty rate would make industry
more internationally competitive, in the present economic circumstances of high unemployment and stagnating economy, lowering import duties across the board is not advisable. At this juncture, South Africa needs to make protection transparent and to rationalize the import duty schedule. Both transparency and administrative ease would be improved by a radical streamlining of the tariff schedule, under which all tariffs would be converted into ad valorem rates. There is no justification for the continuous changes made in the tariff schedule. The cost of such frequent changes, in uncertainty for the rest of the economy and administrative burden for the authorities, is high. Business can adapt to bad policies, but it cannot adjust to an uncertain and variable policy environment. The tariff schedule would be greatly simplified if tariffs were similar for similar goods. Such changes would not only simplify the system and ease the administrative burden, they would probably increase equity by reducing evasion, and would make the system less susceptible to pressure from special interest groups.

South Africa’s recent strategy for export-led growth relies heavily on the concept of "beneficiation," or the adding of value to South Africa’s natural resource products through further processing, such as exporting gold jewelry rather than gold ingots, or aluminum ingots rather than bauxite. The social justification for public support of beneficiation projects is that these provide downstream users with quality inputs at internationally competitive prices. For example, the Columbus stainless steel investment is defended on the grounds that, if just 1 percent of South Africa’s production of stainless steel were converted into local products, it would earn as much foreign exchange as gold does.\(^1\)

But the temptation to make the upstream investments appear profitable by forcing downstream users to pay inflated prices must be resisted. Access to competing imports at world prices is an obvious way to assure that the "benefits" of beneficiation are delivered downstream. Unless this happens, the argument used to justify the upstream investment--downstream products becoming profitable--will prove false. It seems unlikely that a South African manufacturer of stainless steel products will be able to compete with a Korean or a Brazilian competitor for export markets, if the South African must pay more for stainless steel than his competitors.

While it is important to develop backward linkages so as to increase domestic value-added, it needs to be done in a competitive environment where the users are not penalized. The East Asian countries have shown that it is unnecessary to move to upstream products by starting from the lower stages. It is possible (and considerably cheaper) to start from upstream products by importing intermediate goods and raw materials. This allows smaller economies to be more flexible, as they have not tied up large amounts of capital in irreversible investments. South Africa has demonstrated that it can increase its export share across a large range of products in the face of sanctions while being delinked from international capital and technology. With the elimination of sanctions, greater access to international capital and technology and major investments in domestic human capital would

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\(^1\) Mining, A Survey, op. cit., p.3.
ease the problems faced in the transition to a more open and faster-growing economy.

Free access to imported raw materials, intermediate goods, and capital equipment used in the production of exports is very important for the creation of new companies and product diversification. "Free access" means automatic availability of inputs free of import and foreign exchange restrictions as well as from tariffs and indirect taxes. The most important criterion is that eligibility for duty-free importation of imports be automatic for anyone with an export order. There should be no suggestion that access to duty-free imports be conditioned on unavailability of the input from a South African source--as long as this suggestion remains, the South African supplier is protected from international competition, and the upstream producer will be the sole gainer from the beneficiation program. The discipline of international competition is particularly important in the South African economy, where competition among domestic suppliers is limited in many sectors.

There are several ways of achieving free access. The most straightforward is to establish a free-trade regime for the entire economy. This is the approach adopted by Singapore and Hong Kong. A free-trade regime for South Africa at this juncture would be inadvisable because of the transition costs. Some of the most protected sectors are those that employ thousands of workers. Sudden liberalization would probably lead to factory closures with substantial growth in unemployment and, eventually, to a reversal of the policy. A second option is to establish a free-trade regime for exporters in especially designated free-trade zones (also called export processing zones, or EPZs). The third option is to use a duty drawback and exemption system to establish a free-trade regime for exporting activities while maintaining protected trade regimes for the domestic market.

The position on import liberalization has been clarified by the recent agreement with the GATT. By the end of 1994, all quantitative import controls will be lifted and import surcharges eliminated, if the balance of payments is judged to be under control. A major simplification in the tariff system with substantial reductions in tariff rates will also be phased-in by end-1998. By this date, formula duties will have been abolished, and for most products, there will be only 6 industrial basic rates ranging from zero to 30 percent implying a reduction in the average industrial tariff to only 15 percent. Frequent and discretionary changes in tariff levels would become impractical under this new tariff system, thus improving stability and transparency. Tariffs on some products, like textiles and clothing, and electronics, will be adjusted over an eight-year period with higher basic rates of duty. If fully implemented, this plan would go some way along the lines of the first option.

The agreement also outlines additional directions for dealing with anti-export bias. In particular, the GEIS will be phased-out and abolished by end-1997, and an appropriate duty drawback scheme introduced. The second option referred to (EPZs and bonded warehouses) remains under consideration.

While there is continuing interest in South Africa in establishing free-trade zones, international experience suggests that well-functioning duty drawback and exemption systems are more important for countries which already have a well-developed industrial sector.
South Africa now has in place a “self-declaration” system for duty drawbacks and exemptions which relies entirely on exporter information (and conscience) in providing duty rebates. The procedures for using this system are straightforward and streamlined, and its users are satisfied with its implementation. Yet only 360 firms have registered with customs to use the system (4,200 exporters draw GEIS subsidies).

In part, the low utilization of duty drawbacks and exemptions is a result of the structure of GEIS subsidies, which increase in proportion to the percentage of local content. Yet that is an incomplete explanation. Manufacturers can receive the full GEIS subsidy so long as their import content is less than 25 percent of export value. In practice the average import content of manufacturers exporters who receive GEIS is only 6 percent. It is possible that the low levels of importation of inputs by exporters signal that domestic input suppliers are themselves competitive. A more likely explanation is that the orientation of South African firms remains essentially inward, and they have not yet invested the resources to learn at what cost they could source their input requirements for exports in the international marketplace.

As outward-orientation increasingly takes hold, more South African firms are likely to learn about what is internationally available, and increase the share of imported inputs in exports. As that happens, it may be desirable to move from the present drawback and exemption system, based as it is on self-reporting and trust, towards the international norm of a “fixed” system where the refund is estimated according to a preset schedule based on input-output coefficients. In any move towards a new system it is critical to avoid any appearance of making access to imported inputs more restrictive, and to avoid especially any suggestion that exporters should first shop locally for inputs before importing them.

Successful duty drawback schemes share the following characteristics: they guarantee absolute free choice between imported and domestic imports for both direct and indirect exporters; input-output coefficients are updated and published regularly to receive feedback from exporters, and improve the quality of the coefficients; exporters are given a choice of instruments (individual or fixed drawbacks); and there is close cooperation between the business community and the government to improve the technical coefficients and the system’s administration. Simple and transparent tariff schedules characterize the more successful drawback schemes.

Means to offer positive encouragement to export promotion have to be carefully considered. Administrative simplicity was a major reason for replacing the previous export support policies with GEIS. This needs to be improved upon for at least three reasons. First, GEIS is a very imprecise way of offsetting South Africa’s import duties. Second, uncertainty about GEIS’ funding and future is deterring exporters’ long-term decisions. Third, as the South African government is fully aware, GEIS is a counter-viable subsidy under the GATT.

GEIS aside, there is a range of additional ways to encourage export promotion. In many countries, providing automatic access to working capital for exports -- both pre- and post-shipment -- has been a crucial tool of export promotion. The most successful systems have been implemented through the commercial banking system, and have been built around confirmed letters of credit (L/Cs) issued by foreign buyers; guarantee schemes which insure the risks of non-performance by exporters are sometimes important. While South Africa has a well-developed commercial banking system, preliminary research suggests that L/C financing generally is available only for larger firms, and only post-shipment. So there may well be opportunities to broaden access to export finance.

Some countries have been successful in providing technical and marketing support for emerging medium-sized exporters, although the global track record is mixed. The most successful schemes decentralize the delivery of support to institutions (industry associations) that are close to the marketplace. Preliminary research suggests that, while the South African Foreign Trade Organization (SAFTO) provides larger firms with extensive services, technical and marketing support systems for smaller players remain weak. Indeed, some smaller firms had no knowledge of the range of export supports and incentives already available. Work is ongoing to evaluate the support environment for potential exporters, and explore the ways in which this might be improved.

In general, a crucial lesson from international experience has been the importance of relating access to promotional support, and particularly access to capital. The key has been to relate access to other forms of governmental support, and particularly access to capital, to export performance. The Korean government, for example, conditioned its allocations of short and long-term capital to export performance. Tax incentives were also conditional on exports. As a result, production for the domestic market was a spin-off from production for export, and not vice versa. Korean enterprises' decisions about capacity, technology, and so on were made with reference to what was needed to be competitive internationally, rather than with reference to a protected domestic market. The domestic market generated enormous profits that were reinvested in additional capacity. Countries that attempted to follow a more classic infant-industry strategy (compete first under the lax standards of the protected domestic market) then move to export production from that base were much less successful. Having installed capacity and technology that met only the local standard of competition, the owners of this capacity and technology became an entrenched interest against adjusting to a more rigorous international standard.

The ability of the economy to sustain rapid export growth will also depend upon the level of the real exchange rate. In the past, the monetary authorities have had to weigh the concerns of the mining sector against those of other sectors when setting the real exchange rate. The maintenance of a competitive real effective exchange rate has not always been consistent with maintaining high and stable rand prices for minerals. The recommendation here is that a competitive level of the real effective exchange rate is the appropriate target. While

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3 Further work in this area is being done by World Bank staff.
there can be no doubt that the mining sector is very important to South Africa, it is unlikely that it will provide a significant source of real growth. Volatile movements in mineral prices do not have dramatic effects upon production levels and employment, but are absorbed through corresponding fluctuations in the profits of the mining companies. Of course, a long-run downward trend in, for example, the price of gold will lead to mine closures. However, this is the result of a worldwide market mechanism, and not something that should be counteracted through exchange-rate policy.

Both the financial rand mechanism and other foreign-exchange controls should remain in place for the present. It is necessary to curb capital flight during the current period of uncertainty, which is likely to remain during the early months of a new government. Once external capital inflow resumes to a significant extent, the system of foreign exchange controls can be reviewed. The financial rand mechanism can be discarded once the gap between it and the commercial rand has narrowed consistently to a sufficiently small differential.

Job Creation

Providing more jobs is crucial. Finding work for the skilled should be relatively easy, but for unskilled workers, unemployment will remain high for some time. It is critical in terms of efficiency and equity that unemployment be reduced as quickly as possible. Public works schemes will help. Longer-term solutions are more likely to come from rural restructuring and the development of small enterprises.

Most developing countries cannot absorb more than a fraction of their workforce into wage employment. In such countries, the rural areas and, to a lesser extent, the urban informal sector absorb the overflow. In South Africa, the rural areas have been unable to perform this function adequately as much of the country was reserved for white-owned commercial agriculture and other formal-sector activities. Rural restructuring is needed to redress this imbalance.

The combination of weaknesses in the old strategy, gross inequities in the distribution of and access to resources, and political change require a new strategy—one that will serve the needs of a much broader and more varied constituency. In the present circumstances in rural South Africa, there are few development options for agriculture and the rural economy available to a new Government.

One option is to continue liberalizing the present policy environment, while leaving the present structure of agriculture production units unchanged. The process of ongoing liberalization would include: further reform of the input and output marketing system, efforts to reduce the concentration in the agro-processing sector, revision of land sub-division guidelines, and restructuring of the present agricultural credit system. Continued liberalization along these lines will likely result in more bankruptcies among large-scale farms, the expansion of small-scale farming (especially near urban areas), expansion of the horticultural sector, and contraction of cereal and livestock production.

Although the appeal of a more efficient agricultural sector through continued liberalization is clear, the drawback is that
changes in the operation and ownership of the large farm sector are likely to be very slow. The chief reasons for this are that in an environment of uncertainty over land ownership, few large-scale farmers will be willing to make the investments necessary to respond to the new policy environment. Few of those who were disfranchised under apartheid will have the resources needed to gain access--either through lease or purchase to land currently held in the large-scale farm sector. While this option offers some increased efficiency, it is only a partial gain because such an option essentially accepts a large-farm structure which--as this report demonstrates--is inefficient in many critical subsectors.

A second option would expand the first option to include a rural development strategy for the homelands that would feature upgrading of agricultural support services and investing in improved physical and social infrastructure. This has the advantage of continuing the process of policy liberalization and of concentrating public sector resources on some of the most obvious victims of apartheid. Such an option would be likely to contribute to a significant expansion of agricultural production in the homelands, but one that is limited to those few areas in the homelands with good agricultural potential. An obvious drawback is that--given the fragile condition of many of these areas--any effort to intensify agricultural production in the homelands is likely to have undesirable environmental consequences. While this option seeks to address the poverty in the homelands, the efficiency gains are incomplete and the problem of distributional inequity remains largely unaddressed.

A third option builds on elements of the two preceding options--continued policy reform and investment in the homelands and in addition supports a reallocation of agricultural land in the large-farm sector. A reallocation of agricultural land without expropriation would achieve three critical objectives: remove uncertainty regarding confiscation by current owners encouraging those who continue farming to invest; address the present inequitable distribution of land use; and encourage (if the reallocation mechanism is properly designed) those with the greatest interest in land use to gain access to and use land efficiently. These latter objectives would probably lead to a more dynamic rural economy and to greater employment and income creation among low-income groups than would either other strategic option.

Finally, it is important to consider another set of consequences of the present agricultural strategy--its environmental costs. The present overcrowded homelands have a poor resource base and are under population pressure that has led to environmental degradation. In the large-farm sector, the combination of capital intensity, heavy reliance on chemical inputs, and intensive use of marginal lands has resulted in significant environmental damage. By eliminating the policy distortions and supporting a reallocation of land resources, this strategic option will reduce the incentives for this type of environmental degradation.

The lessons of international experience are particularly instructive regarding the consequences of a highly dualistic agrarian structure. In Zimbabwe, a substantial, but poorly-designed program has made only limited contributions to output and employment growth, and has left the land issues as a yet unresolved political and economic liability. Brazil, which has experienced extraordinary
economic growth in the last forty years, has faced serious problems. The agricultural sector, which grew at 4.5% per year during this period was able to generate employment at only a rate of 0.7 percent, ejecting much of the rapidly growing rural population into slums in rural towns and urban centers, resulting in extraordinary social costs.

In the light of international experience and considering the present circumstances in rural South Africa, one must conclude that there are few development options for agriculture and the rural economy available to a new government. One obvious option is to tinker at the margin with land reform and resettlement and avoid significant restructuring. This is essentially the option that has been pursued in the country during the 1980s and in Zimbabwe after independence. It does not solve the problem. Apart from the equity issue, South Africa does not have the luxury of significant areas of unused or underutilized arable land that would allow a politically adequate resettlement program. This means that South Africa must undertake major rural restructuring.

Recognizing the need for rapid and widespread changes in the rural economy, the Bank is working in collaboration with several groups in South Africa to develop a comprehensive rural restructuring program. The program will develop a conceptual framework and mechanisms for achieving a more equitable distribution of agricultural land ownership among racial groups in South Africa. In addition to redistributing land, the program will support the acquisition of physical capital and skills by households participating in the program.

A necessary condition for such a rural restructuring program is a fundamental change in agricultural policies. This would consist of the removal of current distortions in the existing commercial farm sector that constitute a bias against small-scale farmers. The removal of these policy distortions coupled with the creation of a new small-scale, commercial farm sector and related rural industries will generate substantial new rural income, employment and exports.

Although the details of the rural restructuring program are yet to be determined, its main objective is clear: to transfer as quickly as possible a significant share of agricultural land to small-scale, black farmers. The design of the program should establish the optimal mix of market and non-market mechanisms that would achieve this objective. International experience with land reform and rural restructuring suggests a design that relies as much as possible on the existing land market, but with a strong affirmative action component in the form of broadly targeted injections of purchasing power. The need for reliance on market mechanisms stems from the observed weaknesses of non-market-oriented programs that vest too much control in public sector bureaucracies. These develop interests that are in conflict with the rapid redistribution of land. At the same time, non-market interventions may be necessary to ensure successful implementation of the program.

The rural restructuring program will need to be flexible enough to accommodate a range of land use models, but structured enough to prevent abuse. The central elements of the program are likely to include:
Box 5.2 Growth and Small Farmers: Some International Experience

While the evidence documenting the achievements of small farms in expanding output is clear, this does not preclude the co-existence of large-scale farming operations. Since much of South Africa’s agricultural land is not suited to small-scale farming because of soil and climatic constraints, large-scale farming will always be important.

World-wide evidence does not substantiate the fear that a shift to smaller-scale farming would lead to lower production. In Kenya the significant increase in agricultural output which followed the subdivision of the large white-owned estates has been led by small producers. This increase included both food and cash crops. Large and small-scale farmers continue to coexist in a mutually beneficial synergy. In Zimbabwe, the remarkable increase in cotton output since 1980 (almost trebled) is due almost entirely to an expansion of small farm output. Similarly for maize, while national production has declined since independence, the proportion derived from the small producers has increased from less than 10% to nearly 60% in a normal year. A critical factor in both countries, was access to support services (extension, marketing, infrastructure, social) to which small farmers had previously been largely denied.

Perhaps the most dramatic results have been seen in China where, following the dismantling of the huge communes and the allocation of what are mostly very small-units to individual families (less than 2 ha in most cases), agricultural output has expanded at unprecedented rates. More than simply redistributing the land was involved. Other factors such as improved pricing and marketing were also present. The remarkable economic growth in China has been agriculturally led and there agriculture is based on small holdings operated in most cases by part-time family farmers. The dramatic increases in rural incomes which resulted, led to equally dramatic transformation of the rural economy in many areas. The basis for the remarkable increases in agricultural incomes and production in Taiwan and Korea was land reform and redistribution.

International research shows few economies of scale to be had in the agricultural production process beyond that amount of land which one family is able to manage, given any one type of technology (say one 60 hp tractor or one span of oxen). The exceptions are with some plantation crops. But even here, the large operations are not now thought to be as essential. Cane sugar and the South African experience with the increase in the number of out-growers on small, part-time operated farms is an example. Many confuse the scale economies of processing and marketing agricultural commodities with the actual production process. They also tend to confuse the high personal incomes of many large-scale operations with scale economies.
- Government would not buy or expropriate land. Instead, individuals or groups of eligible beneficiaries would be helped to purchase land.

- Groups (or individuals) would purchase land (referring here to both privately held and state-owned land) using a combination of own resources, loans, and a matching grant financed under the program. Land purchased by a group could be legally subdivided among group members or held as a single entity, depending on the group's preferences.

- Groups (or individuals) that participate in this program would also be eligible for subsidies for equipment and technical assistance. These subsidies could be used for a wide range of support, including advice on suitable land to purchase, cadastral surveying, development of infrastructure, strengthening the groups' operations, and extension advice on crop production. This assistance would be designed in such a way that the members of the groups would exercise as much choice as possible over the nature and source of the assistance.

- The criteria for a group's participation in the program would be based on: size of group; income levels; and willingness to commit their own resources to part- or full-time farming.

- Financing of the assistance to the groups (for example, for the vouchers) could come from several sources including an external donor consortium, uncollectible debt claims in the sector, or taxes.

Recent World Bank research estimates that if 30 percent of commercial farm land were transferred over a 5-year period to beneficiaries of rural restructuring, over 1 million additional livelihoods could be created. If only 10 percent of commercial farm land were transferred, the number of additional livelihoods would still exceed 360,000. This is a relatively cheap way of generating new jobs -- between R11,400 and R13,250 depending on the size of the program.

The announcement of a non-confiscatory rural restructuring program and subsequent expenditures on such a program will put upward pressure on land prices, although this may be tempered by the depressant effects of a further increase in interest rates paid by farmers. To the extent that such an increase simply returns land values to a level commensurate with the future value of agricultural profits, this is consistent with the efficient functioning of land markets. If, however, speculative pressures push land values above such a level, further measures such as the sale of government land and increases in farm taxation may be considered.

New jobs could also be created through the development of small-scale businesses. Until the mid-1980s, apartheid legislation constrained growth in this sector, but it has since shown signs of greater dynamism. International experience shows that small enterprises always tend to be more labor-intensive than their larger counterparts; this suggests that a sizeable number of potential jobs may have been lost through past policies. The aim must be to recover these jobs through encouragement of the small-enterprise sector.

4 See World Bank (1993).
Recent work by the Bank suggests that small businesses are constrained by a narrow range of market opportunities and limited access to finance. Deregulation has already removed the biggest restrictions on market entry. The problem now is that small enterprises are concentrated in highly-competitive low-entry sectors, and yet cannot compete in most activities with large firms. The key is not to restrict competition, but to expand the range of market opportunities for small enterprises. What is needed is new market infrastructure close to central business districts where purchasing power is concentrated, and increased access to appropriate financial services.

**Increased Public Investment**

The main proposal is to revive government investment as a proportion of GDP back towards the levels attained during the 1970s. The Bank's sector work shows that new facilities are the strongest requirement of a program of redistributive public expenditure. The case for renewed emphasis on public investment is that there is a great need to expand public facilities for much of the population.

It is for the future government to decide upon the priority areas of capital expenditure. In the initial stages at least, much of this will be deployed towards urban infrastructure in deprived areas, such as sanitation, water supply, local roads, garbage collection, and electrification of existing dwellings, and in the infrastructural needs of the social sectors -- new schools, an extension of existing classroom space and local clinics. In making such investments, the locational distortions introduced under apartheid should not be extended. New sites should be developed in more central urban locations. It is important that a new program does not neglect the needs of the rural sector, otherwise excessive rural-urban migration will be encouraged.

This new public investment should not repeat the mistakes of the past, and be concentrated upon relatively inefficient and highly capital-intensive investments in major parastatals, nor should it be directed towards infrastructural support for white areas, although it is important that infrastructure should be maintained. Where possible, preference should be given to labor-intensive methods in public works projects. Where the public sector is itself the contractor (employment creation schemes) wages should be paid at about one half of formal sector rates (based on informal sector wages), as this will reduce costs and encourage self-selection of the poor.

Considerable resources are needed to step-up public investment adequately. Preliminary estimates from the Bank's urban sector work suggest that the total investment needed to raise urban services to a more acceptable standard over a five-year period in the Witswatersrand area ranges from R6 billion for a minimum service level to over R10 billion for maximum service levels. The cost would be much larger on a national basis. These investments include: upgrading infrastructural deficiencies in all underserved communities;
Box 5.3 Locational Distortions and Restructuring the Budget

Inefficient fiscal transfers to subnational governments, and an urban government structure that impedes the effective utilization of local fiscal capacity, are contributing to a growing fiscal crisis. TBVC and self-governing states have been growing at a rate of about 23% annually for nearly 10 years, absorbing 85% of the growth of central government revenues in FY1990/91 while seeing the allocation of these revenues for capital investments decline to 6% by FY1991/92. The urban economic base is concentrated in the wealthy cities which are able to meet all their recurrent and capital expenditures (at very high standards) out of internally-generated revenues. The poor cities and townships (in which the infrastructure deficiencies occur) depend on most of their basic operational expenditures being financed by transfers from the center. At least for these metros, the capital costs of the backlog could be financed largely out of revenues generated locally by the wealthier cities and the RSCs, with relatively modest increases in taxes and tariffs. The restructuring of local government, together with changes in the system of central government transfers, will be an important part of overall fiscal reform. This will require the sharing of fiscal resources between the highly fragmented local authorities. For such sharing to be efficient and largely locally resourced, it will depend on determining which cities and townships have the most effective spatial and economic linkages, and on establishing an appropriate institutional framework (a metropolitan system of government or of an association between municipalities). Concurrently strengthening the transfer system as part of the general restructuring of the budget will lessen the need to seek additional revenues from the center.

providing infrastructural reticulation to accommodate all housing needs over the next five years; and developing bulk infrastructural capacities to meet the requirements of these additional services. The figures do not include the cost of building new houses.

The costs of new capital expenditure in the education sector are also likely to be large. On the basis of pupil:classroom ratios of 35:1 in secondary and 40:1 in primary, the country needs an additional 50,000 classrooms to provide for students already enrolled. If an additional 1.6 million currently out of school are included, the number of classrooms needed increases to 90,000. If the classroom:pupil ratio is reduced to 35:1 and 32:1 for primary and secondary schools respectively as proposed in the government's recently-released Education Renewal Strategy (ERS), then the number of additional classrooms required will be over 100,000.

According to a recent study the cheapest single-story primary school costs R 64,000 per classroom while the most expensive three-story secondary school comes at R 110,000. By using different designs and construction approaches, the non-government sector has demonstrated that costs can be considerably reduced. But after decades of being provided with inferior school facilities, disadvantaged groups will not accept anything less than has been provided for whites. The option of "double shifting" or "platooning" common in many countries confronted with
less serious backlogs than South Africa currently faces, has been rejected.

At an average cost of R 80,000 per classroom, R 4.0 billion will be needed to accommodate children currently enrolled at school. If in addition, out-of-school children are catered for, the up-front costs could top R 8.0 billion. Much will depend on the method and quality of classroom construction. The recurrent cost implication of factoring-in out-of-school children could be considerable as new teachers would need to be trained, managed and paid. Furniture, equipment and instructional materials will require additional funds.

In the context of higher economic growth, the feasible growth in government investment for redistributional purposes could be impressive. A growth rate of around 5 percent a year in the economy would imply a sustainable fiscal deficit equivalent to about 6 percent of GDP. Within these confines, control of recurrent expenditure growth to 2 percent a year in real terms would be consistent with an increase in capital expenditure from its present level of about 3.4 percent of GDP to a much higher level of about 8.8 percent of GDP over a five-year period. This translates, at 1991 prices, into an average increase of about R11 billion (USD3.6 billion) over the same period -- an annual additional expenditure on the black population in per-capita terms of roughly R325. If, in contrast, recurrent expenditure were allowed to grow at 3.7 percent a year -- its annual average growth over the 1988-92 period -- the corresponding increase in per-capita capital expenditure on blacks would only be around R176.4 per year. The tradeoff between capital and recurrent expenditure is thus an important one.

**Need for Prudent Fiscal and Monetary Policies**

Any expansion in public investment must be accommodated within the limits of a sustainable fiscal deficit. Unless the economy takes off very quickly, growth in recurrent expenditure must be carefully limited or revenue must grow faster than income. If neither is achieved, increased public investment will drive up the deficit beyond sustainable limits.

Even within a highly redistributive public expenditure program, there seems room for restraint to be placed on the growth of recurrent expenditure. The growth in real recurrent expenditure has largely been driven by growth in both the wage bill and expenditure on goods and services. The rise in the wage bill is mainly explained by rapid growth in the number of government employees -- a trend opposite to that observed in other parts of the economy over the past decade. Between 1981 and 1992, the number of employees in central government and the provincial administrations grew by about 34 percent, while in the governments of the Self-Governing Territories it grew by 118 percent. In contrast, employment in local government stood virtually still over the same period. Although an important part of increased government employment can be attributed to a rise in the number of schoolteachers, medical personnel and police officers, there is a strong perception in South Africa that administrations throughout the country have been increasingly overstaffed. The data do not give a sufficiently detailed occupational breakdown to permit further analysis, but the growth in government employment levels is sufficiently striking to suggest that a detailed study of staffing
requirements be matched against existing staffing levels, and that the potential for redeploying staff across the various levels of government be assessed with a view to implementing stricter control on future employment growth.

While this may seem to run counter to the objective of maximizing productive employment growth, experience suggests that overstaffing in government is non-productive -- the aim should be to generate higher employment levels in other parts of the economy. It is not suggested, however, that retrenchments be introduced, nor that there should not be significant growth in the numbers of key personnel. It is very likely that staffing levels in local government will need to grow to implement the investment program in urban areas. The suggested study of staffing requirements should assess the structure of government pay and fringe benefits in relation to levels of remuneration elsewhere in the economy. At present, a primary schoolteacher earns around one and a half times the average black wage -- a pay ratio well out of line with that in other countries. Pay restraint may also have to be examined as a further device to control recurrent expenditure growth.

These points are well illustrated by observations from Bank work in the education sector. As in all other education systems, teachers' salaries comprise the lion's share of the budget; in the homelands over 90% and 70% elsewhere. The average annual salary of a South African teacher, at R 30,000, is the highest in Africa and has been rising rapidly since 1986 with implementation of the policy to unify salaries across races and sexes. Since salaries are linked to paper qualification rather than to productivity and effectiveness, the pressure has been on teachers to acquire additional credentials. While over 99% of teachers in the small white and the smaller-still Asian education systems possess the standard qualification -- Matriculation plus three years of training -- over 60% of teachers in the huge African system do not have this statutory qualification. If the majority of black teachers were to obtain "standard qualification", the country could ill afford to meet its teacher wage bill at present teacher:pupil ratios and level of remuneration. The training, utilization and compensation of teachers carries major policy implications for the national economy.

Fortunately the first steps of education reform -- democratization of education, which is an inescapable political imperative in today's South Africa -- could be carried out with modest additional recurrent cost, provided teachers salaries are maintained within manageable limits. By skillfully managing pupil:classroom and pupil:teacher ratios, many more children could be educated using available resources. Elimination of classroom backlogs, which could be achieved with minimum increase in the complement of the teacher corps, could produce higher learning achievements, leading to enhanced internal efficiency and lower cost per graduate.

Expenditure on goods and services is clearly another area for possible future stringency. Again, little information is available at the level of detail needed to make considered judgements. However, experience in other countries suggests that savings are usually possible, although in South Africa there is probably a need to intensify maintenance of some existing infrastructure.
South Africa has well-organized arrangements for public procurement. The procedures and the relevant management systems are well defined. The procurement lead time is well controlled, and does not exceed 90 days even for complex contracts. However, these features are offset by weaknesses in transparency, equity, and fairness. These matters of concern include: the need for clearly-stated evaluation criteria in the tender documents; registration requirements; preferences; changes in scope and other conditions of contracts; and the method used to select consultants. These matters are being examined by the Bank and will be reported on in due course. Improvements in the procurement system would affect cost-effectiveness in recurrent and capital expenditure.

Not much can be done to increase revenue as a share of GDP. While more detailed evidence is needed, it seems that South Africa's present income tax system may have resulted in problems of tax evasion and disincentives. The scope for shifting the burden of taxation further towards corporations seems limited, although why tax revenue from mining companies has fallen despite no long-term deterioration in the external terms of trade should be examined. Marginal personal-income-tax rates have become substantially higher over recent years, and individual income tax evasion is believed to have become serious. Further tax evasion and possibly increased emigration may result if attempts are made to raise the top rates of personal income tax.

There may be a case for shifting some of the revenue base from central to local government. Bank studies suggest that the fiscal capacity of several metropolitan areas may be sufficient to finance a broad spectrum of the backlog in urban services and infrastructure without recourse to additional central government transfers. The overall fiscal deficit would still rise with increased expenditure, and local governments would borrow to finance local deficits, although there would be some net savings through merging white and black local authorities. Tapping the local fiscal base within any given metropolitan area will require important institutional changes to facilitate the sharing of fiscal resources. For example, preliminary estimates suggest that the combined fiscal resources of the Regional Service Councils and local authorities in the Witswatersrand area would need to increase by only 10 percent in real terms to fund the backlog in urban infrastructure and services. However, without an appropriate institutional framework in the form of a metropolitan government or an association between municipalities, there will be little possibility of drawing on local resources, and dependence on central government transfers will continue.

Careful fiscal policies should be accompanied by a prudent monetary policy. In general, monetary policy has been well-managed. There are only two words of warning. First, it seems unwise to attempt to stimulate the economy through a return to the negative-real-interest regime that prevailed through much of 1973-83. A negative real interest rate would tend to encourage increased capital intensity, raise investment-to-output ratios, and put additional strain on the balance of payments. Such a policy would also do nothing to encourage employment creation. Second, it could be disastrous if a future government engaged in monetization of the fiscal deficit as this would lead to an acceleration in the rate of inflation. Indeed, the
social consequences of a serious rise in inflation could be disruptive. Equally, however, the authorities need to consider the consequences for the real economy of attempting to reduce quickly the inflation rate below its existing level.

4. Short-Term Economic Management

The next two years may well be the most challenging. The new government will inevitably face great pressures to effect visible redistribution and deliver new jobs. Unfortunately, these pressures may be greatest during this early period when the fiscal and external positions will remain fragile and the recovery in economic growth may be slow. While early adoption of the policy framework outlined here should immediately push the economy in the right directions, it will take some years for the benefits to become fully apparent. It may take a year or two after the introduction of new training programs before a new flow of trained workers arrives on the labor market, and there may be a further time lag before their newly-acquired skills can be efficiently adapted to the work environment. Similarly, the transition to a more outward-looking economy will also be gradual. This is now timetabled under the recent GATT agreement for 1994-99.

It is likely that the transition to high stable growth will be difficult to manage. While the unpredictability of this transition suggests that it is impossible to design a crisp short-term policy framework, some useful guideposts can be indicated. Policy actions, even in the short-term, must not work against the central requirements of any successful policy framework, namely, a revival in private investment and an improvement in social stability. This means that pressures for unsound macroeconomic policies and real wage increases unjustified by productivity performance must be strongly resisted.

First, private investors and foreign creditors will be much encouraged to see a sensible and stable macroeconomic policy framework adopted by the new government from the outset. The size of the fiscal deficit as indicated by the budget for 1994-5 is likely to be a key element in this, as investors, while mindful of the needs of South Africa's disadvantaged minority, know that fiscal excesses will lead eventually to some mixture of balance-of-payments difficulties, inflation and high interest rates, and that sooner or later the authorities will be forced to take strong measures to remedy the situation thus leading to a strong contraction in domestic demand. Given low initial levels of investor confidence and the uncertainties regarding South Africa as perceived by the international financial community, the first budget and its immediate successor could do much to allay these fears if the fiscal deficit were kept around 6 percent of GDP. The World Bank's experience, particularly in Latin America, strongly suggests that macroeconomic instability arising from excessive fiscal deficits and other weak domestic policies has been a major factor retarding private investment. Stability in other policy areas is important. For example, the trade liberalization measures as set out under the recent GATT agreement should be scrupulously followed, otherwise investor uncertainties will be amplified.

Second, the possible introduction of confiscatory measures such as nationalization of private assets without adequate
compensation and wealth taxes would (even on a once-and-for-all basis) certainly deter private investment for some time. It is highly plausible that these concerns are contributing to the external capital outflows reported recently by the Reserve Bank. This is not to suggest that the new government should not seek ways of raising additional revenue, but rather that this should come from more tested and reliable sources.

Third, to attract foreign investment, the regulatory framework must be kept reasonably liberal. The biggest fear of foreign investors is that a government will restrict or even eliminate their rights to remit profits and dividends abroad and to disinvest. A clear commitment by a new government would encourage international business. Policy should seek to improve the information flow about procedures and regulations to prospective foreign investors, and avoid unduly severe restrictions on labor permits for highly-skilled foreign employees. The financial rand should continue for the time being as an implicit subsidy on foreign private investment.

Fourth, excessive wage demands should be resisted. Real wages among the unskilled will tend to fall over the next four years, given high unemployment. This process should not be obstructed by minimum wage laws or directives specifying minimum wage increases in collective bargaining agreements or other wage-setting mechanisms. Apart from the negative impact on employment levels that would follow, such policies would tend to compress wage differentials and reduce incentives for skill accumulation. An additional once-and-for-all wage increase above that predicted would slow employment and GDP growth, stimulate inflation, and raise the fiscal deficit through a higher government wage bill.
Chapter VI

SUSTAINABLE GROWTH PATHS:
PUBLIC INVESTMENT AND EMPLOYMENT

Among the many problems that will confront a new government, two stand out: the large gap in the provision of public services across different parts of the population; and growing unemployment. The government will have to tackle both if social stability is to be increased and the economy restored to a higher growth path. Redistribution with growth is a common theme in the 1994 elections. There are lessons to be learned from other countries regarding how much can be achieved in a given period. This chapter defines the limits to redistributive public expenditure over the next few years, and explores the outlook for employment growth. As argued in Chapter V, the priority is to increase public investment rather than recurrent expenditure; here, the limits to public expenditure are examined by considering the maximum sustainable size of a future program of public investment. The chapter also considers the consequences of two possibilities in the early years of any new administration confronted with high expectations and mounting social and political pressure: excessive public expenditure and wage increases above those warranted by productivity growth. To explore these areas, the chapter uses a macroeconomic model outlined here and described in more detail in Annex A.

Large public investments are needed to close the gap in access to public services between different sections of South Africa’s population. For some time now, there have been growing pressures to reorient public expenditures towards the needs of disadvantaged sections of the population, and these may intensify during the early years of a new government. How much additional public expenditure can South Africa afford given the country’s economic constraints? Clearly, this question can only be answered by examining the macroeconomic consequences of increasing public expenditure in South Africa, and evaluating their sustainability.

How Much Public Investment?

Any substantial expansion in public investment (and hence public spending that would have significant redistributive impact) is only sustainable if private investor confidence returns to mid-1970s levels. If private investment responded as faintly to renewed growth as in the 1980s, associated demand effects would tend to be too weak to place the economy on a sustainable path with rising GDP per capita. Although the economy would experience higher growth for a few years, this would falter, and the fiscal demands of maintaining the public investment program would lead to a continued rise in the ratio of public debt to GDP and possibly to an unsustainable balance-of-payments position. The authorities would then be forced to curtail public expenditure growth abruptly, giving the
economy a negative demand shock and leading to a new and severe recession.

We suggest that if the socio-political environment is more conducive to private investment than in the recent past, and if supply-enhancing policies discussed in Chapter V are in place, South Africa can enjoy sustained per-capita growth with substantial redistribution.

This implies the need for greater complementarity between a revival of public and private investment to place the economy on a sustainable growth path. Kick-starting the economy can be done -- in the absence of an immediate private investment revival -- through public investment. But after a short period, the macroeconomic sustainability of the new growth path requires that private investment takes over.

In the absence of an adequate increase in private investment, supply-enhancing policies, such as encouraging an expansion in the skills of the workforce and focusing on international competitiveness, would have little long-term effect on GDP growth, as the economy would be constrained by the level of demand, and tend to lie below the production frontier. In such circumstances, fiscal and balance-of-payments difficulties would arise. Supply-enhancing policies are a necessary -- but not sufficient -- condition for long-term sustainable high growth. They are also strong incentives to induce private investment and create greater social and political stability.

The outlook would be much brighter if private investors could be persuaded to return to the pro-investment stance of the 1970s, as measured by the investment-to-capital ratio. Under all scenarios, the economy could be pushed much closer to its supply frontier and on to a sustainable path regarding the fiscal and external payments positions. The outlook with supply-enhancing policies in place is, however, much more attractive. Under this scenario, GDP and employment grow at 2 to 3 percent per year higher than in the no supply-enhancement case.

The maximum size of an affordable public investment program varies across the scenarios. It would be inadvisable to increase the existing fiscal deficit as a percentage of GDP over the next few years, as this may burden the government with excessive debt if growth is slow to emerge, and give an adverse signal to international creditors and investors. In the absence of improved private investor confidence, little real expansion in public expenditure is recommended, unless revenues can be increased substantially. In contrast, under a successful supply-enhancing policy framework, a revival of private sector confidence could justify a substantial public investment expansion.

It is difficult to use historical behavior of private investment in South Africa as guidance for the future: it is impossible to disentangle the effects of sanctions, confidence depletion and public-private sector interrelationships. The main message is that together with the implementation of supply-enhancing policies, the maintenance of a healthy climate for private investment is crucial if South Africa is to move to a higher growth path. This reinforces the argument in Chapter V, that the most critical elements in a long-term development strategy are to improve social stability, and maintain visibility and
consistency when making and implementing policies.

**Prospects for Employment Growth**

Of course public investment programs would reduce unemployment. However, only a private investment revival would make a considerable difference to employment prospects. Given such a revival, the proportion of unskilled workers without wage employment could fall from its current level of around 50 percent to 38 percent within the next ten years. Without a revival in private investment, the rate of unskilled unemployment in South Africa may not decrease over the same period, although unemployment among the skilled would fall as the economy emerges from the current recession.

Employment growth could be even higher if the structure of production shifted to a more labor-intensive mode. Because of a perceived need for self-sufficiency, large capital-intensive investments were made in South Africa over many years. If such self-sufficiency-driven investments were no longer to take place, simulations with the model suggest that by the early years of the next century, the proportion of unskilled workers without wage employment could fall to 22 percent--substantially below the best result (28 percent) obtained assuming maintenance of the existing production structure.

**Effects of Excessive Wage Increases and Fiscal Indiscipline**

While it is tempting to imagine that redistribution could be attained quickly by simply encouraging large wage rises for unskilled workers, the evidence suggests otherwise. A simulation of the effects of a once-and-for-all wage increase in 1995 of 10 percent above the rate of inflation indicated that not only would employment growth be slowed, but that real wages would actually be at a lower level by the turn of the century. Excessive wage increases are eventually self-defeating. They inevitably stimulate inflation and raise the fiscal deficit by increasing the cost of employing workers in government service.

Fiscal indiscipline, as represented by excessive government expenditure, could have even worse results, particularly, if accompanied by a fall in private investment. Under this scenario, growth in GDP and employment would decline, and the economy would soon face mounting public and foreign debt and faster inflation. Such expenditures would eventually work to the disadvantage of most of the population.

**1. The Approach**

This chapter examines alternative paths that the economy would be likely to follow under different stimuli. The criteria used here to judge the quality of any given development path follow from the objectives laid out in Chapter V. An appropriate development path would possess the following characteristics:

- Positive per-capita growth -- the higher the better;
- Falling unemployment -- the faster the better;
- Greater equality in income and wealth -- the more the better;
• Improved access of the disadvantaged to public services -- the more the better;

• A prudent fiscal position -- the lower the deficits the better;

• Stable inflation -- the lower the better;

• An external balance-of-payments position that does not lead to excessive foreign debt -- the less the debt the better.

Trade-offs tend to arise between these objectives. For example, faster growth tends, given an accommodating monetary policy, to be associated with higher inflation. Higher redistributive government expenditures are good for the redistributional objectives, and may stimulate growth in GDP and employment, at least in the short-run, but tend to put pressure on the fiscal position and the balance of payments. Some judgments as to the sustainability of any given development path are necessary. The sustainability criteria used here are that over the period 1993-2001:

• The government’s debt-to-GDP ratio should stabilize or fall by the end of the period;

• The national foreign debt-to-GDP ratio should similarly stabilize or fall;

• Inflation should not exceed the 20 percent range per year as an average of any given four-year period.

Projections made for the period, 2002-2005, give some feel for the longer-run properties of the paths considered. As these projections are less reliable, and as the period is of less interest to policymakers, these are not used when judging sustainability.

These criteria are broader than those that appear in the literature\(^1\). The standard approach taken with regard to fiscal and external positions, is to determine levels of the fiscal and external current account deficits consistent with maintaining stability in the ratios of government and foreign debt respectively to GDP. These criteria, while giving useful long-run guidelines regarding the size of the two deficits, lack flexibility when judging growth paths. No sacrosanct value may be attached to any particular debt ratio, although there are maximum levels that should not be exceeded and there is no reason why these ratios should not vary over time. The imperative in South Africa is to improve social stability by addressing backlogs in social expenditures remaining from the apartheid era. In the scenarios, the fiscal deficit tends, during early years, to be above its long-run sustainable value. But this does not mean that the fiscal position is out of control, as the situation is remedied later.

The econometric model outlined is used to simulate the effects of alternative policy measures. The results are then evaluated according to the characteristics of the growth path and the sustainability criteria. This model predicts, for any given set of changes in major economic policy variables, the time paths for a wide range of economic variables including: GDP and employment growth rates; the rate of inflation; and movements in the balance of payments and foreign debt. Although it does not directly measure impacts on income and wealth, it provides proxies through predictions.

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\(^1\) See Annex A for a more formal discussion.
of movement in employment and wages across racial groups.

2. The Model

The South African economy is complex. A major change in the level of an important variable such as public investment will inevitably create wide repercussions that will affect virtually every relevant economic variable in the system. While "back-of-the-envelope" calculations are often useful when looking at short-term effects, an examination of the behavior of key variables for the longer-term requires a more rigorous approach.

The model is based on a set of econometric equations estimated for 1960-92. Our aim was to identify the main quantitative relationships that have driven the South African economy over this period, and to use these to examine the consequences of different policies and changes in exogenous factors that affect the economy. As in most macroeconomic models, the structure is relatively aggregated in that the various sub-sectors of the economy are not dealt with in the greatest possible detail. The model nevertheless predicts all conventional national income values (and many more). In total, the model comprises around 300 identities and equations of which 45 econometric equations were estimated using time-series data. The mathematical specification of the model is laid out in Annex A.

To give an idea of the scope of the analysis it is worth listing the major endogenous variables simulated under the scenarios. All variables can be generated in both nominal and real values. The variables include:

- GDP -- factor cost and market prices;
- Private and government consumption;
- Investment -- private firms, households, parastatals, and the financial sector;
- Capital stock similarly broken down;
- Exports -- gold and all other goods and non-factor services;
- Imports -- oil and non-oil;
- Prices -- producer, consumer, export, import, and the GDP deflator;
- Taxation -- direct and indirect;
- Employment -- skilled and unskilled;
- Wages -- skilled and unskilled;
- Employment and wages of black and white labor.

A number of variables are taken as exogenous in the model. These divide into those subject to policy control and those that lie outside such policy control. The policy variables include those related to fiscal and monetary policy, for example government employment and other items of recurrent expenditure, government investment, and the discount rate as set by the Reserve Bank. These policy-related variables may be treated differently across the frameworks. Additional exogenous variables include the gold price, gold production, some socioeconomic variables linked to domestic social stability, world inflation, and income growth in the industrialized countries. These are assumed to
have identical time paths in all scenarios. Once the future values for all the exogenous variables are set, the model then solves for the time paths of the endogenous variables listed.

The model has three unusual features regarding its treatment of: excess demand and supply in the product market; disequilibrium in the market for skilled workers; and the impact of changes in the distribution of factor income. These features give greater generality than is found in many macroeconomic frameworks.

The treatment of product market permits an evaluation of both demand-stimulating and supply-raising measures. Most macroeconomic models can be classified as demand-constrained (Keynesian) or supply-constrained (Neoclassical). The present model can switch between either regime. The model decides for each year, whether a demand or a supply constraint is binding upon the economy, and then solves for the various macroeconomic variables accordingly. In a demand-constrained model, the various demand aggregates that make up expenditure on GDP, for example, private consumption, government expenditure, private investment, are separately projected, and GDP is then calculated from the relevant national-accounts identity. In such a model, supply-raising effects have little effect, as the economy is assumed to be at less than full capacity, so that any addition to total demand can quickly raise output through the use of previously underutilized resources. In contrast, a supply-constrained model calculates GDP from one or more production functions in which output is usually taken as a function of capital and labor inputs. In this type of model, additional output can only be created through an increased supply of productive inputs, and not, in the short-run at least, through growing demand. The present model combines the methods of both approaches, as it calculates GDP both from the national-accounts identity and a production function, and then takes whichever value is lower.

This 'switching' approach seems particularly appropriate when analyzing the South African economy. There is little doubt that the South African economy is operating along a demand constraint. Increased aggregate demand should raise GDP, although supply-enhancing measures would have no immediate effect. These features would be predicted by a demand-constrained model. But if the economy were to undergo a sustained revival in demand, the supply constraint would eventually be reached, and further demand stimulus would increasingly lead to higher inflation and a deterioration in the balance of payments, while supply-enhancing measures would generate faster GDP growth. The supply-constrained model would now be the appropriate analytical tool. This switching facility gives the best of both worlds, in that it acts as a demand-constrained model during demand-constrained years and as a supply-constrained model during supply-constrained

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2 Increased potential aggregate supply may have some macroeconomic effects through lower inflation, even in a demand-constrained economy. Such effects are predicted by the model. See Annex A.

3 Additional demand may affect future levels of GDP through its effects on the current level of investment. This is discussed in Annex A.

4 We estimate that in 1992, South Africa’s GDP lay at about 9.3 percent lower than its achievable level with full utilization of resources. This compares with 5.5 percent for 1991. This estimated increase in excess supply between the two years is partly due to the effects of the drought.
years. This gives more realism and more flexibility to the projections.

The second feature refers analogously to the market for skilled labor. At present there is unemployment among skilled workers, but there is little doubt that this will disappear as demand revives and the labor market tightens. In periods of excess supply of skilled workers, the model will calculate skilled employment according to the relevant demand relations. However the model will also sense when the supply of skilled workers presents a constraint (when there is full employment among the skilled) and will accordingly equate skilled employment with skilled-worker supply. This feature is invaluable when assessing the impact of measures aimed at increasing the supply of skilled workers, as it allows one to examine the growth-raising effects of easing the skilled-labor constraint, and to warn against a situation in which numbers of skilled workers are expanding too rapidly and newly-trained workers are failing to find jobs.

The third feature of the model is that it allows a number of the major macroeconomic variables to be directly affected by what happens in the labor market through changes in the distribution of income between wages and profits. This operates through three main equations determining private consumption, private investment and producer price. The most important of these relations -- the consumption function -- has the property that private consumption is more strongly affected by movements in the wage bill than by changes in total profits. For example, if the employment situation improves substantially, then the share of wages in GDP will rise, and private consumption will grow rapidly, relative to output. An employment-intensive growth path gives higher private consumption growth than a more capital-intensive alternative. The effects of employment and wage growth have an opposite effect on private investment through the investment function. If employment and wages grow rapidly, then the real rate of profit will fall and this will dampen private investment growth. In the model, the stimulatory effects on consumption outweigh the depressant effects on investment. These observations have a clear implication for the consequences of a public investment program -- the more jobs generated, the more stimulus to aggregate demand, and the more quickly will the economy recover. Rising wages tend to raise the rate of inflation in the model unless productivity is growing more rapidly.

3. Effects and Sustainability of Higher Public Investment

Three Scenarios

The central approach uses the model to examine the economic effects of launching hypothetical redistributive public investment programs of different sizes over and above recent public investment levels, and to then judge their sustainability and feasibility. We investigate the maximum sustainable size of a public investment program under three scenarios.

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5 A technical feature of the model is that falling unemployment is associated with rising real wages. The share of wages in GDP thus tends to rise during periods of rapid employment growth.
Scenario A: Status quo, no policy change, and R1 billion at 1985 prices Government investment injection per year on average during 1994-1997, no policies to induce supply enhancement with private investment response as in the past;

Scenario B: Status quo, no policy change, and a slightly higher Government investment injection, no policies to induce supply enhancement but with a small revival in private investor confidence;

Scenario C: Policy reforms leading to both supply enhancement, greater private investment confidence and a much larger public investment injection (see Table 6.2 for details).

Public investment decisions should be evaluated under a reasonably wide variety of assumptions regarding the effects upon the economy of other accompanying policies and constraints. The economic impact of these additional public investments is likely to depend strongly upon other prevailing conditions. In particular, any given level of public investment is clearly more affordable the healthier the state of the private sector, as the tax base and private savings are larger. The effect of any given public investment program will tend to be more sustainable, if productivity growth in the private sector is faster. These scenarios are in no sense forecasts of South Africa's economic future, but illustrations of the general directions that the economy may take. The results suggest that there may be vast differences in economic performance under a number of criteria between different policy regimes.

Supply enhancement here means that worker skills are upgraded at a high, but feasible, rate, and that greater export-orientation is achieved with positive effects on total factor productivity growth. In all three scenarios, external influences on the economy, such as changes in the gold price, the international inflation rate and world demand for South Africa's non-gold exports, are assumed identical.

The scenarios differ according to the assumptions made in a number of key areas:

- export orientation;
- accumulation of skills;
- total factor productivity (TFP);
- private-sector investment response.

Annex A gives details of these assumptions.

Scenario A, (status quo and no supply enhancement) looks at what might happen if the policy mix follows a pattern similar to that of recent years (Table 6.1). Exports and total factor productivity are expected to grow at a rate similar to the historic average; skill accumulation proceeds at a modest rate as in the past; and both the real exchange rate policy and the Reserve Bank discount rate are maintained as over recent years. Fiscal deficits are financed through accumulation of government debt. Scenario B, (some revival of private investment confidence) is the same as A but improved investor confidence adds private investment over and above that predicted by the model. The supply-enhancing Scenario C examines the consequences of implementing a much more growth-enhancing and redistributive policy stance. It assumes more active efforts to promote exports, which, given a competitive domestic environment, allows higher TFP growth, and a higher rate of skill.
accumulation in which an average of 60,000 additional unskilled or semi-skilled workers are trained each year until 2005.

Additional training is assumed to start in 1994, but not to produce newly-skilled workers until 1996. Skills upgrading produces 21,000 newly-skilled workers in 1996, rising to 60,000 by 2005. Exchange-rate and interest-rate policies continue as under the base case. Improved investor-confidence adds private investment over and above that of scenario B to assess what would happen if investor confidence revived significantly given, for example, greater social stability. The investment-to-capital ratio of the 1970s when the ratio of total investment-to-GDP attained about 25% is used as the guideline.

The size of the public investment program (see Table 6.2) is a particularly critical assumption. In the first four years of the experiments (1994-97) we assumed in all scenarios that total Government investment (at 1985 prices) would average R3 billion per year (as compared to about R2 billion in 1993). This represents about R1 billion per year additional public investment. A wide range of such proportions could be considered, and, as the experiments described in Annex A show, the higher the allocation to marketed activities, the faster is GDP growth and the more sustainable the growth path. The public investment programs are assumed to start in 1994. Other items of government expenditure such as recurrent items grow at the same rates in all experiments (See Annex A).

One potentially controversial feature of these scenarios is that external current account deficits are assumed to be financeable through foreign investment or borrowing. As noted in Chapter V, this has not been the case over recent years. But times are changing. With the cooperation of major political parties, the authorities have obtained a final arrangement regarding the repayment of the debt overhang from 1985, and all relevant remaining sanctions are being lifted.

There is now greater optimism regarding foreign finance than before, and political leaders are campaigning to encourage private foreign investment. In conducting the experiments, we have been cautious in judging the sustainability of the balance-of-payments position.

The scenarios are much less optimistic, however, about the availability of foreign aid. They assume that no grants will be available above present levels. This is perhaps over-pessimistic as the donor community is currently evaluating its presence in the new South Africa. In doing this, donors must take into account South Africa's per-capita income level and the needs of poorer developing countries. The size of future donor inflows remains uncertain.

The scenarios provide answers to four questions. What are the economic consequences following a substantial increase in public investment? How large should a viable program be? What share of the backlog in social expenditures could be eliminated? How much external-finance will South Africa need?

**Economic Impact of Increased Public Investment**

An expansion in public investment will immediately affect a recession-stricken economy in different ways. First, additional
Table 6.1: Assumptions of Scenarios A, B and C.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Export Orientation (above what model predicts)</td>
<td>Past export trends prevailing, no change from model (1% to 2% growth per annum)</td>
<td>Moderate non-gold export growth (2% to 3% growth per annum)</td>
<td>Higher non-gold export growth (4% growth per annum)</td>
</tr>
<tr>
<td>Exchange Rate Policy</td>
<td>Continuation of past policy</td>
<td>Same as in Scenario A:</td>
<td>Same as in Scenario A:</td>
</tr>
<tr>
<td>Skills Accumulation and Skills Upgrading (Total upgraded refers to 94-2005 period)</td>
<td>Past growth trend prevailing, no change from 90s increase in skilled labor supply (rate of 1.62% growth per annum)</td>
<td>Same as in Scenario A:</td>
<td>Higher increase in supply of skilled labor (about 20 to 60,000 additional skilled workers per annum; tot. upgrad: 441,000)</td>
</tr>
<tr>
<td>Total Factor Productivity (TFP) growth rates</td>
<td>Past TFP rate prevailing, no change from late 1980s (rate of 0.4% per annum)</td>
<td>Same as in Scenario A:</td>
<td>Growth in TFP rates corresponding to policy changes &amp; export-orient. (back to the 70s). (0.8% per annum 94-97 then 1.1% p.a.)</td>
</tr>
<tr>
<td>Government Employment Policy</td>
<td>Moderate growth -- 2% per annum</td>
<td>Same as in Scenario A:</td>
<td>Same as in Scenario A:</td>
</tr>
<tr>
<td>Technology of Production</td>
<td>No change from estimated production function</td>
<td>Same as in Scenario A:</td>
<td>Same as in Scenario A:</td>
</tr>
<tr>
<td>Monetary Policy</td>
<td>Continuation of past policy</td>
<td>Same as in Scenario A:</td>
<td>Same as in Scenario A:</td>
</tr>
<tr>
<td>Public Investment Program &amp; Additional Private Investment response</td>
<td>See Table 6.2 below for details</td>
<td>See Table 6.2 below for details</td>
<td>See Table 6.2 below for details</td>
</tr>
</tbody>
</table>
public investment will directly add to domestic demand and reduce the gap with potential supply -- GDP will rise. Second, such expenditures, in the form of building new roads and schools or in irrigating land, will directly create new jobs during implementation. This will put upward pressure on wages. Third, the fiscal deficit will immediately rise, unless offset by rising taxation, and add to government debt. Fourth, higher domestic expenditures will induce increased imports, and possibly reduced exports, if producers divert production towards home markets, and cause a deterioration in the external current account balance. Fifth, increases in unit labor costs and the reduction in the spare capacity of the economy may stimulate additional inflation. All these effects will be present as long as there is continued growth in public investment, (all are present to differing degrees in the experiments shown in Table 6.3).

There are secondary effects both on the demand and the supply side of the economy. On the demand side, increased incomes will stimulate private consumption -- the multiplier effect, and higher growth in the economy will encourage private investment -- the accelerator effect. Potential supply -- the maximum amount that the economy is capable of producing on a sustained basis -- is affected through a number of mechanisms. Insofar as additional public investment is in the production of goods and marketable services, this will add to potential supply in the economy. For example, new irrigation will lead to higher crop yields -- a positive benefit. There are negative supply effects, however. Rising demand in the economy will put pressure on financial markets, and tend to push up real interest rates which may dampen private investment. Real wage rates will tend to increase if unemployment falls; this will slow employment growth. These effects are predicted in the model and reflected in the results of the experiments.

For an expanded public investment program to force the economy on to a sustainable path, sufficient growth must be generated to offset the otherwise negative fiscal and balance-of-payments effects -- the economy must "grow its way out of trouble". The expected sequence runs as follows: increased public investment raises aggregate demand through both its direct impact on domestic absorption and through associated multiplier and accelerator effects.

If demand rises quickly enough, it will eventually catch up with potential supply, and the economy will be at full capacity. Subsequent growth in GDP can only come through increased inputs into production and improved productivity. Provided that these conditions are met, and that supply grows fast enough, the fiscal deficit will eventually fall as a percentage of GDP, and the external current account will move into a surplus. In practice of course, the movement along an expanding supply frontier is unlikely to be smooth, as the economy will inevitably receive a number of shocks, but these blips can be counteracted through short-term fiscal and monetary policies.

Experiments with the model strongly suggest that this rosy description of the growth process will not apply to South Africa, unless private investment responds more positively to renewed growth. The heart of the problem is that the overall impact of increased public expenditure or demand alone is likely to be insufficient, as the multiplier effect is too
### Table 6.2: Assumptions for the Public Investment Program under Scenarios A, B and C

*(Annual Averages)*

(ZAR=South African Rand)

Source: World Bank Staff

<table>
<thead>
<tr>
<th>SOUTH AFRICA ASSUMPTIONS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT</th>
<th>SCENARIO A: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO B: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO C: SUPPLY ENHANCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACTUAL</td>
<td>HISTORICAL</td>
<td>HISTORICAL INVESTMENT RESPONSE</td>
</tr>
<tr>
<td>Public Investment Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Government Investment (trend)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAR 1985 Million</td>
<td>2,194</td>
<td>3,805</td>
<td>3,128</td>
</tr>
<tr>
<td>(b) &quot;Additional&quot; Gov. Investment/1992</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAR 1985 Million</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1. Total Government Investment = (a)+(b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAR 1985 Million</td>
<td>2,194</td>
<td>3,805</td>
<td>3,128</td>
</tr>
<tr>
<td>Parastatal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Total Parastatal Investment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Public Investment Program = (1)+(2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAR 1985 Million</td>
<td>5,637</td>
<td>12,211</td>
<td>13,559</td>
</tr>
<tr>
<td>Private Sector Investment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Normal&quot; Private Investment (model)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAR 1985 Million</td>
<td>5,407</td>
<td>10,419</td>
<td>14,726</td>
</tr>
<tr>
<td>&quot;Additional&quot; Private Investment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAR 1985 Million</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
small. Although one would not expect to find a large multiplier in a country like South Africa with high marginal propensities to save, import and tax out of income, another special factor is linked to the dual nature of the economy. The model has the property that private consumption is more strongly linked to real wage incomes than to profits -- a property that is supported by time-series econometric evidence. This is congruent with the fact that the great bulk of private savings are generated by the corporate sector. At present nearly 50 percent of the South African labor force is without wage employment, and, given labor supply growth of about 2.5 percent per year, this will worsen unless employment generation is accelerated substantially. Rising unemployment also puts downward pressure on real wage rates with the inevitable result that wage incomes will fall relative to GDP. The result of all these factors is that the demand response through private consumption -- the largest single component of GDP -- is unusually small.

The results of the scenarios in Table 6.3 illustrate both types of growth path. In each case, experiments were carried out with different levels and sequences of public investment to find the largest total injection of public investment consistent with a sustainable path for the economy. As with all macroeconomic projections, the results are least robust in the later years, given greater unreliability of the assumptions and the potential for cumulative error.

Figure 6.1 shows alternative growth paths from a starting point, A, at which there is substantial spare capacity in the economy. The dashed and solid straight lines in the diagram show hypothetical growth paths under policy regimes with and without supply-enhancement policies. The path in which the economy experiences sufficient demand stimulus following additional public investment to hit the supply constraint is given in the no-supply-enhancement case by the straight line from A to the constraint, (and subsequently by the direction indicated by the arrow A to C). A path where demand grows insufficiently to reach the same supply constraint is also shown (A to B). Clearly, if supply-enhancing policies are in place, an even greater demand stimulus is needed, but subsequent growth is higher (A to D).

The lowest case, scenario A, in which no supply-enhancing policies are implemented and there is no revival of investor confidence, never reaches the supply constraint, and shows negative per-capita GDP growth and no reduction in unemployment. The stock of foreign debt accumulates rapidly in the late 1990s, given sizable external current account deficits. Experiments in this lowest case with different levels of additional public investment generally found that the system lacked sufficient demand pressure to reach the supply constraint, which had low growth potential given weak private investment. Further experiment under the framework with supply enhancement but no private investment revival produced much the same result. Although the growth properties were more attractive, the need for initial demand expansion was even greater (Table 6.3). Further experiments were made only in scenarios that included a revival in private-investor confidence.
### Table 6.3: Results of Scenarios A, B and C
(Source: World Bank Staff Projections)

<table>
<thead>
<tr>
<th>SOUTH AFRICA RESULTS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT 4/20/94 18:51</th>
<th>SCENARIO A: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO B: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO C: SUPPLY ENHANCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Growth Rates (average percentage change per year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product</td>
<td>5.7</td>
<td>3.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Private Consumption</td>
<td>5.4</td>
<td>4.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Investment</td>
<td>8.6</td>
<td>5.8</td>
<td>2.0</td>
</tr>
<tr>
<td>o/w Private</td>
<td>8.5</td>
<td>6.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Rate of Inflation (average percentage change per year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Consumption Prices</td>
<td>12.3</td>
<td>10.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Percentage without Wage Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled</td>
<td>26.8</td>
<td>29.8</td>
<td>36.6</td>
</tr>
<tr>
<td>Skilled</td>
<td>15.0</td>
<td>15.0</td>
<td>16.7</td>
</tr>
<tr>
<td>Real Wages (1985 prices, Rds/Month)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled</td>
<td>269</td>
<td>366</td>
<td>473</td>
</tr>
<tr>
<td>Skilled</td>
<td>1,343</td>
<td>1,689</td>
<td>1,842</td>
</tr>
<tr>
<td>Black Worker</td>
<td>269</td>
<td>366</td>
<td>473</td>
</tr>
<tr>
<td>Fiscal Indicators (percent of GDP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surplus(+)/-Deficit(-)</td>
<td>1.3</td>
<td>0.1</td>
<td>-1.8</td>
</tr>
<tr>
<td>Government Total Debt</td>
<td>45.3</td>
<td>39.0</td>
<td>32.6</td>
</tr>
<tr>
<td>External Account (percent of GDP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Account Balance</td>
<td>-1.6</td>
<td>-0.1</td>
<td>-0.5</td>
</tr>
<tr>
<td>Foreign Debt</td>
<td>18.4</td>
<td>29.7</td>
<td>31.7</td>
</tr>
<tr>
<td>Public Investment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billion Randis (1985 prices)</td>
<td>5.56</td>
<td>12.15</td>
<td>13.59</td>
</tr>
<tr>
<td>Percent of GDP</td>
<td>8.6</td>
<td>12.5</td>
<td>11.3</td>
</tr>
</tbody>
</table>
The scenario shown with greater investor confidence, but no supply enhancement (scenario B), gives more encouraging results. Per-capita real GDP growth is positive from the mid-1990s onwards, and the percentage of workers without wage jobs falls appreciably, generating some upward pressure on real wages. As the economy is at full capacity in this experiment, and as unit labor costs rise given higher wages and slower growth, inflation builds in later years. We judge this experiment to be sustainable before 2001, as both foreign and government debt fall as a percentage of GDP. The sustainable amount of additional real public investment is not large.

The highest case (scenario C) is where supply-enhancing policies are in place, and the economy enjoys a substantial revival in investor confidence. GDP growth is much better in this experiment and approaches 5 percent per year towards the end of the century. The labor market indicators are more encouraging with more rapid employment growth, and real wages rise significantly. The fiscal position is satisfactory, and although small current account deficits appear during the 1990s, foreign debt falls relative to GDP.

In all cases (A, B and C), however, the last period's average rate of inflation seems to threaten the sustainability of the experiments. This result derives essentially from the assumption of a continuing passive monetary policy in the model. The effect of inflation is fully taken into account for instance in private investor behavior (through the increase in the real interest rate which affects negatively investment) but the "implicit" behavior of the monetary authorities may be understated by the experiments. Tougher monetary policies will lead to slightly different scenarios with lower end period inflation but also lower-investment if credit is more constrained.

The sustainability of scenarios A and B is threatened over 2002-2005 by rapidly-rising foreign debt arising from high current account deficits.

The Maximum Size of Government Investment

How big is the maximum government investment\(^6\) program if we examine scenarios A, B and C? The answers given here deal only with the absolute limits to government investment. To achieve these limits, the government would have to permit high, though sustainable, fiscal deficits measured as a proportion of GDP for a number of years. The discussion here deals only with that part of public investment that goes through the government budget and not with parastatals: it is assumed that the latter will recoup the returns on their investments through the sale of goods and services. With supply-enhancing policies in place, the limits to government investment are clearly larger than in their absence, as GDP growth is higher (Table 6.4).

Over 1994-2001, total government investment could be as high as R22 billion at 1985 prices in the lower growth case, and R35 billion if faster growth is achieved through supply-enhancing policies -- average

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\(^6\) The term, "government investment" refers here to fixed capital formation by government as defined in the national accounts. It is substantially less than the figures for government "capital expenditure" as given in the government accounts.
Figure 6.1:

Demand Expansion and the Supply Frontier

Demand-driven policies starting from point A (excess capacity) will reach:
- with supply enhancement point D
- without supply enhancement points B (if demand is insufficient) or C (with higher level of demand)

Supply Constraint:
- with supply enhancement
- without supply enhancement
investment levels equivalent to 1.9 percent and 2.7 percent of GDP respectively. These figures compare with the historical low of 1.5 percent of GDP allocated to government investment in 1992 (see Table 6.2). Figures 6.2 to 6.7 show the paths of important macroeconomic variables for the three scenarios.

These figures represent additional government investment, over and above the 1993 level, averaging R0.8 and R1.3 billion at 1985 prices per year over 1994-2001 in scenarios A and B respectively. A substantially higher level of government investment could be accommodated under scenario C (an additional R2.3 billion at 1985 prices annually during the 1994-2001 period, and an additional R7.3 billion in 2002-2005).

Reducing the Social Backlog

How much of the social backlog of capital expenditures can be eliminated by the maximum affordable public investment program?

Here we need to compare the latest estimate of the size of the social backlog with the results of the scenarios. The results indicate that under all three scenarios, a total of roughly additional R12 billion at 1992 prices can be afforded during the first 4 years of the new dispensation. From South African sources7, we estimate the size of the social investment backlog to be roughly R46 billion at 1992 prices (see Table 6.5). If this estimate is correct, then about a quarter of the total backlog can be addressed during the first 4 years of the new Government.

Over the following 4 years, 1998-2001, the remainder of the backlog could be roughly cleared under scenario C. However, if the macroeconomic situation is closer to that of Scenario A, then the room for maneuver is more restricted, and only about 13 percent of the remaining backlog could be cleared. Scenario A would imply that less than 40 percent of the estimated backlog of capital expenditures would be addressed in the first 8 years of the new administration.

Foreign Finance

How much long-term (LT) foreign finance would the economy need? Under scenarios B and C, the foreign financing requirements of the economy would be modest in the early years. During 1994-97, the economy requires little to cover existing debt repayment. These financing needs then rise over subsequent years as the current account moves into deficit. But given substantial growth in the economy, external LT financing would never go much over 1 percent of GDP in scenario C before the year 2001. Under scenarios A & B, however, the external financing requirements would be more severe (see Table 6.4).

4. Can Higher Employment Growth Be Achieved?

In the best scenario (scenario C with high private investment response and supply
South Africa: Economic Performance and Policies

Figure 6.2:

[Graph showing GDP real growth rates over time with different scenarios and population growth rate indicated.]

Figure 6.3:

[Graph showing total unemployment rate over time with different scenarios.]
**Figure 6.4:**

Fiscal Deficit (percent of GDP)

**Figure 6.5:**

Total Foreign Debt (percent of GDP)
Figure 6.6:

Real Wage of Unskilled Labor (1985 ZAR per Month)

- Scn. B
- Actual
- Scn. C
- Scn. A

Figure 6.7:

Current Account Balance (percent of GDP)
Table 6.4: Size of Government Investment Program and External Financial Requirements
(Source: World Bank Staff Projections)
(ZAR=South African Rand)

<table>
<thead>
<tr>
<th>SOUTH AFRICA</th>
<th>SCENARIO A: NO SUPPLY ENHANCEMENT HISTORICAL INVESTMENT RESPONSE</th>
<th>SCENARIO B: NO SUPPLY ENHANCEMENT REVIVAL OF INVESTOR CONFIDENCE</th>
<th>SCENARIO C: SUPPLY ENHANCEMENT REVIVAL OF INVESTOR CONFIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Size of Government Investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current ZAR Million</td>
<td>5,941</td>
<td>12,775</td>
</tr>
<tr>
<td></td>
<td>Percent of GDP current mp</td>
<td>1.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td></td>
<td>Foreign Financing Requirements (Country)(*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current ZAR Million</td>
<td>1,843</td>
<td>6,561</td>
</tr>
<tr>
<td></td>
<td>Current USD Million</td>
<td>536</td>
<td>1,676</td>
</tr>
<tr>
<td></td>
<td>Percent of GDP current mp</td>
<td>0.5%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

(*) Current Account Deficit+Debt Repayments + Increase in Foreign Exchange Reserves
enhancement), the percentage of the labor force out of wage employment was almost 37 percent in 1998-2001 and near to 26 percent in 2002-2005. There is strong reason to believe that even higher levels of employment growth can be achieved. It is well established that substantial investments of a highly capital-intensive nature were made in South Africa over many years. In our attempts to explore the technological parameters of the production frontier we noted (Annex A) the growing bias over time towards increased capital intensity (this is discussed in Annexes B and C). In the experiments, these parameters were frozen at 1992 values. What would happen if these parameters moved to their 1970 values? This is explored in scenario D. This assumes that self-sufficiency-driven investments will no longer take place, and may be indicative of the growing small business sector and the shift towards small-scale agriculture.

Scenario E incorporates the shift towards greater labor intensity as in D, but also assumes that the external international environment will become more favorable to the South African economy in the long-run: higher gold prices; higher demand for SA’s non-gold exports; higher inflation in SA’s major export markets; and lower spreads over the country’s borrowing interest rates.

When compared to scenario C (supply enhancement and revival of investor confidence), the central lessons that emerge from D and E are:

- A more labor-intensive production technology (small-scale businesses and agriculture) is capable of substantially lowering the proportion of the labor force without wage employment, which drops from about 26 percent over 2002-2005 in scenario C to 20 and 18 percent respectively in scenarios D and E. This increase in employment generation takes time, however. An additional effect is that unit labor costs rise as increased labor intensity reduces labor productivity. This generates additional inflationary pressure.

- A favorable external environment can increase substantially the growth of both gold and non-gold exports. Additional foreign demand and favorable relative prices can increase annual average export growth rates over the simulation period by 5 percentage or more. That, in turn, increases annual GDP growth by 1 to 2 percentage points over 1994-2005.

5. Some Risks: Excessive Wage Increases and Fiscal Indiscipline

There are many reasons why any of the scenarios could be over-optimistic. This section looks at two plausible cases in which growth paths could be derailed: excessive wage rises and fiscal indiscipline.

Excessive Wage Increases

Given the volatility of the political situation in South Africa, it is plausible that pressures could build in the early years of a new government to encourage significant increases in the wages of unskilled workers. While this would give some short-term redistribution towards the lower paid, adverse effects on employment and inflation. The scenarios discussed earlier, could give no guide to this, as they determined the real wages of both skilled and unskilled labor through the estimated econometric equations in the model.
Table 6.5: Fiscal Demands (Assumptions)


<table>
<thead>
<tr>
<th>SOUTH AFRICA</th>
<th>5 years program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1992</td>
</tr>
<tr>
<td></td>
<td>Rd. Bil.</td>
</tr>
<tr>
<td><strong>Area of Expenditure:</strong></td>
<td></td>
</tr>
<tr>
<td>Water and Sanitation (nb. of households)</td>
<td>13.0</td>
</tr>
<tr>
<td>Improved Water Delivery</td>
<td>6.0</td>
</tr>
<tr>
<td>Rural Population (13 million)</td>
<td>2.0</td>
</tr>
<tr>
<td>Urban Population (4 million)</td>
<td>4.0</td>
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<tr>
<td>Improved Sanitation</td>
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</tr>
<tr>
<td>Rural Population (2 million)</td>
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<tr>
<td>Urban Population (3 million)</td>
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<td>Education (nb. of schools)</td>
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<td>75,000 primary class-rooms</td>
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<td>20 Colleges</td>
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<tr>
<td>New Buildings</td>
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<td>Material, Supplies and Training Teachers</td>
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<td>Health (nb. of clinics)</td>
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<tr>
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<tr>
<td>2,500 clinics</td>
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<tr>
<td>New Buildings</td>
<td>1.5</td>
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<tr>
<td>Building 50 community health centers</td>
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<td>Material and Supplies</td>
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<td>Housing (nb. of units)</td>
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<tr>
<td>Upgrading Public Hostels</td>
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<td>Miscellaneous in Housing</td>
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<td>Building New Houses (10-15,000 Rds/unit)</td>
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<td>from 100,000/year to 300,000/year</td>
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<td>Sub-Total for social infrastructures</td>
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<td>GRAND TOTAL</td>
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Additional experiments were therefore necessary to illustrate the impact of alternative incomes and wage policies on the macroeconomic framework.

Two experiments are used to assess the impact of excessive wage increases. Both take scenario C as a starting point, but impose different wage behavior. In the first, the level of the real unskilled wage is raised by 5 percent in 1995 over and above that predicted by the model. In subsequent years, however, the predictions of the model are used. The second experiment also incorporates a 5 percent real wage increase in 1995, but assumes real wage resistance in subsequent years. Under this second experiment, trade unions are thus assumed to gladly accept real wage increases, but to successfully oppose all real wage reductions. For 1996 onwards, the model’s prediction is used if it predicts a positive real wage increase, but the real wage increase is set to zero if the prediction is negative. Please note that these experiments imply very different paths for real wages from those predicted in scenarios A to E where real wages fell in the early years given high unemployment.

The third experiment is designed to explore a situation in which incomes policies succeed in reducing the real wage. In this experiment, the level of the real unskilled wage was reduced by 2.5 percent annually over 1995-1997 and then by 1 percent annually until 2005.

The main conclusions of the first two experiments are that active real wage policies do not contribute to the main objectives of the new Government. The first experiment is only a modest departure from scenario C, and shows a similar time path, although the inflation rate is on average about 3 percentage points higher annually during the second half of the 1990s, and the country’s external position worsens slightly. The impact of excessive wage increases is seen much more vividly in the second experiment in which employment growth is significantly depressed after 1995, thus raising the proportion of workers without jobs by as much as 3 percent in most years. Inflation is up by about 10 percentage points during 1994-97, thus reducing the competitiveness of exports and depressing private investment through increased uncertainty. Consequently, the GDP real growth rate during 1994-97 is 1.7 percentage points lower than in Scenario C. Fiscal deficits increase as a proportion of GDP given higher wages of civil servants, and the external current account deficit increases by 2 to 3 percentage points of GDP, thus increasing external indebtedness. Ironically, real wage resistance does not lead in the long run to higher real wages for unskilled labor, as higher unemployment reduces real increases in the unskilled wage to a level below that predicted for the later years of the simulation under scenario C. The third experiment gives more encouraging though ambiguous results. Cuts in the real wage of unskilled labor produce short-term higher growth and less inflation as expected. There is also a substantial increase in medium to long-run employment growth, and by the early 2000s, the proportion of workers without wage employment is reduced by about 3.7 percent when compared with scenario C.

**Excessive Public Expenditure**

Severe risks are associated with over-ambitious and expansionary fiscal policies that would be perceived as unsustainable by the
private sector and the international community. The adverse consequences of the episodes of macro-populism\(^8\) in Latin America are well-known to South African policymakers of all political affiliations. However, South Africa could embark on such a route if it seeks to eliminate the totality of the social backlog immediately through public expenditures regardless of the long-term sustainability of such a fiscal expansion.

As an illustration of these risks, we simulated a situation derived from Scenario C. In this 'populist' variant of Scenario C, we kept the same amount of public investment as before and added R9 billion a year over the 1994-1997 period as additional Government recurrent expenditures. In addition to this, Government employment was allowed to increase by one percentage point a year above its level in Scenario C (about 20,000 additional employees a year in 1994-1997). The most important assumption is that private investment would fall in response to what would be perceived as an unsustainable expansionary path. It is assumed that private investment would decline by about R2 billion a year during 1994-1997, followed by a further decline of about R10 billion per year in 1998-2001. All other assumptions are kept the same as in Scenario C.

South Africa would fall into the classical difficulties of such unsustainable growth paths. First, the level of the fiscal deficit reaches the 10 percent of GDP mark in 1994-1997, rebounds to about 9% in 1998-2001 and worsens to 12% in 2002-2005. Second, the expansion in GDP is much lower than in Scenario C in 1994-1997 (2.8% against 3.8%), and drops to very low levels at the end of the simulation (1% real growth against 5% in Scenario C). Third, the current account deteriorates substantially (by about 1 to 2 percentage points of GDP each year with regard to the near balance of Scenario C). Fourth, inflation picks up strongly initially (by an additional 5 to 6 percentage points per year in 1994-1997).

Under this bleak scenario, South Africa would be locked in by both domestic and external debt traps, with foreign interest payments amounting to about 2-3 percent of GDP and domestic interest payments at about 8 to 10 percent of GDP. Even worse, the populist policy package would not achieve its aims -- about 50 percent of the labor force would still be without wage employment by the end of 2005.

6. Concluding Remarks

The results of our experiments support the conclusion that a healthy climate for private investment is essential. Without this, sustained growth will not take place. The experiments also support the policy framework outlined in Chapter V -- supply-enhancing policies will work if the conditions are right. As always, the results are sensitive to the specification of the model and to the assumptions made in the experiments. But we hope that these results will assist the debate regarding the policies to be followed. One thing is clear: South Africa could have a bright future, but only with the right policy mix.

REFERENCES

OF MAIN REPORT


PART III

ANNEXES
ANNEX A

THE MACROECONOMETRIC MODEL FOR SOUTH AFRICA (SAMM)
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Annex A

The Macroeconometric Model For South Africa

PART I

1. The Model

An Overview of the South Africa Macroeconometric Model (SAMM).

The Model described in this paper is a one-commodity, one-sector, four agent (households, Government, Corporate Firms and rest of the world) dynamic macro-econometric model based on a set of econometric equations estimated for 1960-92. The aim in constructing this model was to identify the main quantitative relationships that have driven the South African economy over this period, and to then use these to examine the consequences of different policies and changes in exogenous factors that affect the economy. As in most macroeconomic models, the structure is relatively aggregated in that the various sub-sectors of the economy are not dealt with in the greatest detail. However, for some equations and aggregates (such as exports, imports, gross domestic fixed investment, and so on.) it was felt that some disaggregation was necessary (such as between gold and non-gold exports, oil and non-oil imports, housing and non-housing private investment.). The model predicts all conventional national income values. It comprises about 300 identities and equations of which 47 econometric equations were estimated using time-series data: (see Tables A.3 to A.5 in Part II and Part III of this paper).

The principal concern of the SAMM is to offer a realistic tool based on credible agents' and macro-aggregates' behaviors and able to simulate economic scenarios for the new South Africa. The aim was also to strengthen the credibility of these scenarios by always working within a quantified and consistent macroeconomic framework. However, accounting consistency is not enough for an economy as complex as that of South Africa: some of the most important relations of the model (such as investment, production, labor demand) had to be backed by robust econometric estimations which would be important for determining baseline solutions in the simulation exercises.
Accordingly, the SAMM was constructed to deal with both substitution effects deriving from shifts in relative prices (for example, capital/labor, exports and imports) and the effects of absolute changes in quantities and prices (for example, exogenous demand or price shocks).

Although the SAMM was built to define long-term (15-years) sustainable economic growth paths, it was also meant to provide policymakers with short-term (one-year) indicators enabling the monitoring of long-term sustainable growth paths.

**Three Major Features of the South Africa Macroeconometric Model (SAMM).**

The model has three unusual features regarding its treatment of: excess demand and supply in the product market; disequilibrium in the market for skilled workers; and the impact of changes in the distribution of factor income. Together these give greater generality than found in many macroeconomic frameworks.

The treatment of the product market permits an evaluation of both demand-stimulating and supply-raising measures. Most macroeconomic models can be classified as demand-constrained (Keynesian) or supply-constrained (Neoclassical). The present model can switch between either. The basic approach is that the model decides for each year, whether a demand or a supply constraint is binding upon the economy, and then solves for the various macroeconomic variables accordingly. In a demand-constrained model, the various demand aggregates that make up expenditure on GDP, such as, private consumption, government expenditure, private investment are separately projected, and GDP is then calculated from the relevant national accounts identity. In such a model, supply-raising effects have little effect, as the economy is assumed to be at less than full capacity\(^1\), so that any addition to total demand can quickly raise output through the use of previously underutilized resources. In contrast, a supply-constrained model calculates GDP from one or more production functions in which output is usually taken as a function of capital and labor inputs. In this type of model, additional output can only be created through an increased supply of productive inputs, and

---

\(^1\) Increased potential aggregate supply may have some macroeconomic effects through lower inflation, even in a demand-constrained economy. Such effects are predicted by the model.
not in the short run at least through growing demand\textsuperscript{2}. The present model combines the methods of both approaches, as it calculates GDP both from the national-accounts identity and from a production function, and then takes whichever value is lower.

This 'switching' approach seems particularly appropriate when analyzing the South African economy. There are strong indications that the South African economy is operating along a demand constraint\textsuperscript{3}. Increased aggregate demand should thus raise GDP, although supply-enhancing measures would have no immediate effect. These features would be predicted by a demand-constrained model. But if the economy were to undergo a sustained revival in demand, the supply constraint would eventually be reached, and further demand stimulus would increasingly lead to higher inflation and a deterioration in the balance of payments, while supply-enhancing measures would generate faster GDP growth. The supply-constrained model would now be the appropriate analytical tool. This switching facility gives the best of both worlds, in that it acts as a demand-constrained model during demand-constrained years and as a supply-constrained model during supply-constrained years. This ability to sense the relevant constraint binding upon the economy, and then predict accordingly, gives particular realism and more flexibility to the projections.

To illustrate these points, Figure A.1 shows alternative growth paths from starting point, A, at which there is substantial spare capacity in the economy. The thin straight lines with no arrows show the economy's supply constraint (production frontier) under two assumptions regarding supply-enhancement policies (with or without). The thicker and solid straight lines with arrows in the diagram show hypothetical growth paths. The path in which the economy experiences sufficient demand stimulus following say, additional public investment to hit the supply constraint is given in the no-supply-enhancement case by the straight line from A to the constraint, and subsequently by the direction indicated by the arrow (A to C). A path where demand grows insufficiently to reach the same supply constraint is also shown (A to B). If supply-enhancing policies are in place, an even greater demand stimulus is needed, but subsequent growth is higher (A to D).

\textsuperscript{2} Additional demand may affect future levels of GDP through its effects on the current level of investment.

\textsuperscript{3} We estimate that in 1992, South Africa's GDP lay at about 9.3 percent lower than its achievable level with full utilization of resources. This compares with 5.5 percent for 1991. This estimated increase in excess supply between the two years is partly due to the effects of drought.
The second feature refers analogously to the market for skilled labor. At present there is unemployment among skilled workers, but there is little doubt that this will disappear as demand revives and the labor market tightens. In periods of excess supply of skilled workers, the model will calculate skilled employment according to the relevant demand relations. However, the model will also sense when the supply of skilled workers presents a constraint, that is, when there is full employment among the skilled, and will accordingly equate skilled employment with skilled-worker supply. This feature is invaluable when assessing the impact of measures aimed at increasing the supply of skilled workers, as it allows one to examine the growth-raising effects of easing the skilled-labor constraint, and to warn against a situation in which numbers of skilled workers are expanding too rapidly and newly-trained workers are failing to find jobs.

The third feature of the model allows a number of the major macroeconomic variables to be directly affected by what happens in the labor market through changes in the distribution of income between wages and profits. This operates through three main equations determining private consumption, private investment and the producer price. The most important of these relations -- the consumption function -- has the property that private consumption is more strongly affected by movements in the wage bill than by changes in total profits. If, for example, the employment situation improves substantially, then the share of wages in GDP will rise, and private consumption will grow rapidly relative to output. An employment-intensive growth path thus gives higher private consumption growth than a more capital-intensive alternative. The effects of employment and wage growth have an opposite impact on private investment through the investment function. If employment and wages grow rapidly, then the real rate of profit will fall and this will dampen private investment growth. The estimated parameters of the model are such, however, that the stimulatory effects on consumption outweigh the depressant effects on investment. This has a clear implication for the impact of a given public investment program -- the more jobs generated then the more stimulus to aggregate demand, and the more quickly will the economy recover from recession. However, rising wages also tend to raise the rate of inflation in the model unless productivity is growing more rapidly.

A technical feature of the model is that falling unemployment is associated with rising real wages. The share of wages in GDP thus tends to rise during periods of rapid employment growth.
Figure A.1:

Demand Expansion and the Supply Frontier

Supply Constraint:
• with supply enhancement
• without supply enhancement

Demand-driven policies starting from point A (excess capacity) will reach:
• with supply enhancement point D
• without supply enhancement points
B (if demand is insufficient) or
C (with higher level of demand)
2. Using the SAMM Model

*Defining a sustainable high economic economic growth path through scenarios.*

The assumption used as a starting point in our work is that a new Government in South Africa would want to test the macroeconomic sustainability of public expenditure programs aiming at addressing the back-log of social expenditures and reducing the level of unemployment. Thus, one objective of the SAMM was to explore the macroeconomic consequences of increased public investment by examining the alternative paths that the economy is likely to follow under different stimuli to aggregate demand through increased public expenditure. The criteria used here to judge the quality of any given development path follow from the objectives laid out in Chapter V, although some additions are needed to ensure that the path is sustainable. An appropriate development path would possess the following characteristics:

- Positive per-capita growth -- the higher the better;
- Falling unemployment -- the faster the better;
- Greater equality in income and wealth -- the more the better;
- Improved access of the disadvantaged to public services -- the more the better;
- A prudent fiscal position -- the lower the deficits the better;
- Stable inflation -- the lower the better;
- An external balance-of-payments position that does not lead to excessive foreign debt -- the less debt the better.

Trade-offs tend to arise between these objectives. For example, given an accommodating monetary policy, faster growth tends to be associated with higher inflation. Higher redistributive government expenditures are good for the redistributional objectives, and may stimulate growth in GDP and employment, at least in the short-run, but tend to put pressure on the fiscal position and the balance of payments. Some judgements as to the sustainability of any given development path are clearly necessary. The sustainability criteria used here are that over a long-term period to be defined, say, 1993-2005, or longer:

- The government's debt-to-GDP ratio should stabilize or fall;
- The national foreign debt-to-GDP ratio should similarly stabilize or fall;
- Inflation should not exceed the 20 percent range per year as an average of any given four-year period;
The SAMM is used to simulate the effects of alternative policy measures. The results are then evaluated according to the characteristics of the growth path and the sustainability criteria. This model predicts, for any given set of changes in major economic policy variables, the time paths for a wide range of economic variables including: GDP and employment growth rates; the rate of inflation; and movements in the balance of payments and foreign debt. Although it does not directly measure impacts on income and wealth, it provides useful proxies through predictions of movement in both employment and wages across racial groups.

**Macroeconomic sustainability: external debt-to-GDP ratio.**

The criteria used to define the sustainability of a growth path are broader (and vaguer) than those that appear in the current literature on the subject. One reason for a broader definition is that the legacy of apartheid in South Africa makes it imperative to take into account the country's political economy and the need to address the back-log of social expenditures to bring about political stability (a main condition for the resumption of private sector-led growth).

Following the 1982 debt crisis, especially in Latin America, an extensive literature has been developed on the issue of optimal external borrowing strategies and their linkages with a country's fiscal policy (see Van Wijnbergen [1989]). The literature produced some simple and useful accounting relations regarding the dynamics of external indebtedness and sustainable borrowing strategies.

Assume\(^1\) that \(e\) is the real exchange rate, \(b^*\) is the debt-output ratio (which in a sustainable growth path needs to be stabilized at a given level), \(B^*\) the dollar value of foreign debt, \(P^*\) an export-weighted price index of the country's trading partners (in US dollars), \(y\) real output, \(E\) the nominal exchange rate of local currency versus the US dollar, \(P\) the local price index, \(r^*\) the average real interest rate on foreign debt and NICA the non-interest current account of the balance of payments to

output ratio. Accounting identities lead to the following dynamics (a dot (.) indicates changes and a hat (^) percentage changes:

\[ b^* = \left( \frac{B^*}{P^*} \right) \left( \frac{e}{y} \right) + E \left( \frac{P^*}{P} \right) \]

\[ \dot{b}^* = -NICA + (r^* - \tilde{y})b^* + \dot{e}b^* \]

Increases in the debt-output ratio result from any one of three factors: a deterioration of the non-interest current account to output ratio, a rise of real foreign interest rates above the real growth rate of the local economy, and the capital loss on the country's external debt due to real depreciation of the local currency. Van Wijnbergen discusses extensively the two options a country faces to stabilize or lower the debt-to-output ratio: to transfer net resources to creditors by running large enough current account surpluses; or to pursue high output growth. These options are alternatives rather than complements because of the interplay between short-term adjustment and long-term results: the first requires usually short-term cuts in domestic expenditures (investment is usually a strong candidate) which trigger recessionary effects in the short-run and capacity contraction in the long-run (most Latin American countries and Eastern European debtors pursued this option during the early 1980s). Van Wijnbergen argues strongly that the second (which relies on high output growth) requires also expenditure shifts to channel the economy's resources into productive, trade-oriented capital expenditures (for example through increased public investment, incentives for private investment, or both). In addition, attention should be paid to the risks of a real appreciation of the exchange rate because typically any increase in domestic demand will tend to put upward pressure on the exchange rate. Despite the associated capital losses on the external debt stock, we recommend keeping the commitment to an exchange rate that would maintain or steadily improve its external competitiveness (a constant of depreciating real exchange rate). Empirical evidence shows that such a strategy is essential to maintain a country's creditworthiness because commercial credit ratings tend to put more emphasis on an economy export-orientation and on the debt-export ratio than on the debt-to-output ratio. Turkey followed this type of debt and export strategy quite the opposite of that of most Latin American countries.

For South Africa, when we assume that the country will maintain a constant real exchange rate \( \dot{e}b^* = 0 \), the steady state \( b^* = 0 \) sustainability condition for the external debt strategy is that the
non-interest current account balance should on average at least equal the initial debt times the difference between the average real interest rate on foreign debt and the economy real growth rate:

\[
NICA = \left( \frac{Y - C - I}{Y} \right) \geq (r^* - \hat{y}) \left( \frac{B^*}{Y} \right)
\]

\[
Y - C - I = CA - r. B^* \geq (r^* - \hat{y}). B^*
\]

Two important points follow this relationship for South Africa: the country has potentially more room for manoeuvre than the average middle-income countries because of its low initial debt-to-GDP ratio (16.2% in 1992); its low apparent average real interest rate on foreign debt (2-3% for the 1986-1992 period); and its promising growth potential during a recovery. South Africa's external indebtedness strategy could be similar to that of Turkey (whose debt to GDP ratio was around 50% during the boom of its economy in the 1980s): high growth, export-orientation and debt-to-GDP ratio between 25 to 50%. Even with a 5% real interest rate, the required current account surplus for a growth strategy of about 5% p.a. would be either close to zero or even a small deficit. Table A.1 illustrates the hypothetical NICAs required for South Africa to maintain its current solvency, given the preceding assumptions:

<table>
<thead>
<tr>
<th>b*</th>
<th>16.0 %</th>
<th>25.0 %</th>
<th>50.0 %</th>
<th>25.0 %</th>
<th>25.0 %</th>
<th>50.0 %</th>
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<tbody>
<tr>
<td>r*</td>
<td>3.0 %</td>
<td>3.0 %</td>
<td>3.0 %</td>
<td>5.0 %</td>
<td>7.5 %</td>
<td>5.0 %</td>
</tr>
<tr>
<td>y (hat)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1.0 %</td>
<td>0.6 %</td>
<td>1.0 %</td>
<td>2.0 %</td>
<td>1.5 %</td>
<td>2.1 %</td>
<td>3.0 %</td>
</tr>
<tr>
<td>0.0 %</td>
<td>0.5 %</td>
<td>0.8 %</td>
<td>1.5 %</td>
<td>1.3 %</td>
<td>1.9 %</td>
<td>2.5 %</td>
</tr>
<tr>
<td>1.0 %</td>
<td>0.3 %</td>
<td>0.5 %</td>
<td>1.0 %</td>
<td>1.0 %</td>
<td>1.6 %</td>
<td>2.0 %</td>
</tr>
<tr>
<td>2.0 %</td>
<td>0.2 %</td>
<td>0.3 %</td>
<td>0.5 %</td>
<td>0.8 %</td>
<td>1.4 %</td>
<td>1.5 %</td>
</tr>
<tr>
<td>3.0 %</td>
<td>0.0 %</td>
<td>0.0 %</td>
<td>0.0 %</td>
<td>0.5 %</td>
<td>1.1 %</td>
<td>1.0 %</td>
</tr>
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<td>-0.3 %</td>
<td>-0.5 %</td>
<td>0.3 %</td>
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<td>5.0 %</td>
<td>-0.3 %</td>
<td>-0.5 %</td>
<td>-1.0 %</td>
<td>0.0 %</td>
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<td>6.0 %</td>
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<td>-0.8 %</td>
<td>-1.5 %</td>
<td>-0.3 %</td>
<td>0.4 %</td>
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<tr>
<td>7.0 %</td>
<td>-0.6 %</td>
<td>-1.0 %</td>
<td>-2.0 %</td>
<td>-0.5 %</td>
<td>0.1 %</td>
<td>-1.0 %</td>
</tr>
<tr>
<td>8.0 %</td>
<td>-0.8 %</td>
<td>-1.3 %</td>
<td>-2.5 %</td>
<td>-0.8 %</td>
<td>-0.1 %</td>
<td>-1.5 %</td>
</tr>
</tbody>
</table>

Source: Staff estimate
Macroeconomic sustainability (II): fiscal deficit-to-GDP ratio.

External sustainability is only part of the requirements for an overall high sustainable growth path: internal imbalances have to be considered, particularly the domestic debt dynamics. Here, too, an extensive literature\(^2\) has emerged which seems applicable to South Africa. The algebra, however, is essentially the same because of the similarity of the two debt-dynamics. In addition to the assumptions on external debt, we assume that FD is the fiscal deficit, \(B_G\) the initial stock of domestic debt held by the Government, \(r\) the domestic real interest rate on Government debt, \(B^*_G\) the initial stock of foreign debt held by the Government and \(M\) monetary financing of the fiscal account. Lower cases denotes ratios to GDP and a hat denotes a percentage change. Hence, the steady state condition for a sustainable (non-interest or primary) fiscal deficit is:

\[
\left( \frac{FPD}{Y} \right) = \left( \frac{REV - NIEXP}{Y} \right) = \frac{fd \leq \left( \frac{(r-\gamma) \cdot b_G + \left( [r^* + \gamma] - \gamma \right) \cdot b^* + \hat{M}}{Y} \right)}{}
\]

In South Africa, both the foreign debt held by the Government and the monetary financing of fiscal deficits have been small (for the former, this is in part due to the economic and financial sanctions). Hence, the maximum sustainable primary deficit (in the absence of any increase in Government external borrowing) would depend on the differential between the real interest rate on Government's debt and the real growth rate of the economy. For South Africa, given a growth path aiming at an average 5% p.a. growth rate, an initial ratio of Government debt-to-GDP of 41.7% in 1992 (higher in 1993 because of the inclusion of debt coming from the TBVC States endorsed by the Government), and a real interest rate of about 2%, an objective of maintaining a constant Government domestic debt-to-GDP ratio would allow running a small primary fiscal deficit of about 1% of GDP. If this assumption prevails, this corresponds to an overall fiscal deficit of 5 to 6% of GDP. Table A.2 gives some examples of this proposition:

\(^2\) Take for instance Van Wijnbergen [1989], op. cit. Part IV, pp. 308-311.


Table A.2: South Africa: Sustainable Primary Fiscal Deficits/Surpluses (% of GDP) given assumptions on $r, b_G, \hat{y}$

<table>
<thead>
<tr>
<th>$b_G$</th>
<th>41.7 %</th>
<th>41.7 %</th>
<th>41.7 %</th>
<th>41.7 %</th>
<th>50.0 %</th>
<th>70.0 %</th>
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<tr>
<td>$r$</td>
<td>-1.0 %</td>
<td>0.0 %</td>
<td>1.0 %</td>
<td>2.0 %</td>
<td>2.0 %</td>
<td>3.0 %</td>
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<tr>
<td>$\hat{y}$</td>
<td>0.0 %</td>
<td>0.4 %</td>
<td>0.8 %</td>
<td>1.3 %</td>
<td>1.5 %</td>
<td>2.8 %</td>
</tr>
<tr>
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<td>-0.4 %</td>
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<td>-1.3 %</td>
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<td>-2.5 %</td>
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<tr>
<td>0.0 %</td>
<td>-0.8 %</td>
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<td>-2.5 %</td>
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<tr>
<td>1.0 %</td>
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<td>-2.1 %</td>
<td>-2.5 %</td>
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<tr>
<td>2.0 %</td>
<td>-0.4 %</td>
<td>-0.8 %</td>
<td>-1.3 %</td>
<td>-1.7 %</td>
<td>-2.1 %</td>
<td>-2.5 %</td>
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<tr>
<td>3.0 %</td>
<td>-0.4 %</td>
<td>-0.8 %</td>
<td>-1.3 %</td>
<td>-1.7 %</td>
<td>-2.1 %</td>
<td>-2.5 %</td>
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<tr>
<td>4.0 %</td>
<td>-0.4 %</td>
<td>-0.8 %</td>
<td>-1.3 %</td>
<td>-1.7 %</td>
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<tr>
<td>5.0 %</td>
<td>-0.4 %</td>
<td>-0.8 %</td>
<td>-1.3 %</td>
<td>-1.7 %</td>
<td>-2.1 %</td>
<td>-2.5 %</td>
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<tr>
<td>6.0 %</td>
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<td>7.0 %</td>
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<td>8.0 %</td>
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<td>-2.5 %</td>
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Source: Staff estimate

**Macroeconomic sustainability: inflation.**

The final quantitative criterion used in our work concerns the level of inflation. Because of South Africa's record of moderate inflation the problem is distinct from that of stabilizing very high levels of inflation$^2$ (see Bruno and alii. [1988], Bruno [1991]). In fact the discussion here draws on episodes of "moderate" inflation in the range of 15 to 30 percent per year, as defined$^4$ by Dornbusch and Fisher [1993]. They argue that theoretical explanations of moderate inflation rely on the role of seigniorage as a source of Government finance or on reluctance to pay a high cost to end inflation. Empirical studies in the paper show that, in fact, seigniorage explains little of the persistence of

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moderate inflation and that reduction of inflation to low, single-digit levels can be achieved only at a substantial short-term cost to growth.

South Africa's inflation episodes belong to the category of moderate inflation: inflation fluctuated between 10 and 20% for the last 30 years. South Africa's determinants of inflation (see the description of the model's price equations), are very close to the Dornbusch and Fisher typical model for persistent inflation: inflation is determined by a cost-based pricing equation (that is a mark-up rule over wage costs and exchange rate adjustment); wages, in turn, obey a wage-setting equation that has some degree of indexation with past inflation; and the exchange rate rule follows a constant real exchange rate target. Combining these three relations tends to predict persistent inflation. This model seems applicable to South Africa, a primary exporter of minerals including gold, where there has been reasonable constancy in the real exchange rate over recent years, wage indexation in the formal sector and oligopolistic pricing.

Would the cost of ending this level of moderate inflation in South Africa would be substantial? The recent desinflation in South Africa suggests a positive answer, confirming the conclusion that desinflation to low inflation rates implies a significant cost to output. In the three country-case studies of successful episodes of desinflation from moderate to low levels (Spain, Ireland and South Korea), Dornbusch and Fisher show that non-market contractionary measures (restrictive incomes policies, wage cuts, strong fiscal contraction, and so on) are to be used to obtain significant results. In South Africa too, the contraction due to the past (1989-1993) recession reducted inflation to a single digit level in 1993.

Our work also shows (see the SAMM scenarios) that attempts to get inflation further below the 10% mark would imply trade-offs between income redistribution, growth and inflation rates. Results so far suggest that restrictive measures on incomes and monetary policy (for example a one-time cut in the real wage) could have short-term effects in bringing inflation down by 1 to 3 percentage points (with regard to a base case). However, that would cost about 0.5 or 1 percentage points of growth per annum on average in the medium-long-term and would imply coping with a deterioration of the social climate and industrial relations in the short-term.
Macro Sustainability Applied to South Africa: a path and not a set of ratios.

The criteria reviewed have provided some guidelines concerning the definition of a sustainable high growth path. This revolves around a targeted real growth rate of 5% per year, with a maximum current account deficit of about 1% of GDP and a maximum fiscal deficit of about 5-6% of GDP in the medium-to-long-term (1% primary plus 4-5% interest payments). Those figures would be consistent with a foreign debt-to-GDP ratio between 25% to 50% and a Government domestic debt-to-GDP ratio between 40% to 60%.

The work with the SAMM aims to avoid defining the sustainability of a growth path too narrowly by focussing exclusively on a set of ratios deriving from fixed values and growth rates. The ratios are inapplicable if future conditions differ greatly from the present. Given the prospect of much faster growth and strong social demands for redistributive expenditures, it may make sense to lower a high fiscal deficit gradually, even if this level of deficit appears unsustainable when evaluated at initial conditions. This would not mean that the macroeconomic situation is out of control. This paper contends that the initial period for the new Government will address the back-log of social expenditures, within limits to be defined and respected.
PART II

THE MAJOR BLOCKS AND EQUATIONS OF THE MODEL

1. Blocks, Endogenous and Exogenous Variables of the SAMM.

The SAMM is organized in 9 blocks of equations and identities. To give some flavor of the scope of the analysis, the blocks of the model and the major endogenous variables simulated are listed here. Where relevant, all variables are generated in both nominal and real values. The blocks are:

**Block 1:** The Real Economy, which includes the following endogenous variables:
- GDP -- factor cost and market prices;
- Private and Government consumption;
- Investment -- private firms, households, parastatals, and the financial sector;
- Exports -- gold and all other goods and non-factor services;
- Imports -- oil and non-oil;

**Block 2:** Production and factor demand in the Real Economy, with:
- Production function, notional output;
- Capital stock -- private firms, households, parastatals, and the financial sector;
- Employment -- skilled and unskilled;
- Spare capacity in the economy;

**Block 3:** Prices, Wages determining the Nominal Economy:
- Prices -- producer, consumer, export, import, and the GDP deflator;
- Wages -- real and nominal, skilled and unskilled;

**Block 4:** Government Fiscal Account:
- Taxes -- Direct and Indirect;
- Revenue;
- Expenditures -- Current, Interest, Capital;
- Fiscal balance and its financing;

**Block 5:** Households Account:
- Income;
- Expenditures and Disposable Income;
- Households Savings;
Block 6: Corporate sector (Firms) Account:
- Income;
- Expenditures --Interest payments-- and Profits;
- Corporate Savings;

Block 7: Debt:
- Government --Domestic, Foreign;
- Firms --Domestic, Foreign;
- Country Total;

Block 8: Monetary sector:
- Savings --by agent
- Money supply;
- Money Demand --Demand for Credit--;
- Interest rates --money market, discount rate, T-Bill--;

Block 9: Balance of Payments:
- Trade Balance and Factors Payments;
- Current Account Balance;
- Short and Long-Term Capital Movements;
- Change in Net Foreign Assets;

Figure A.2: Simplified Diagram of the Real Economy in the SAMM
The 'switching' approach implies that the SAMM confronts at each iteration, the level of potential output (production capacity) derived from its production function with the level of aggregate demand coming from the modelling of the usual macroeconomic aggregates (private and Government consumption, Investment, Exports and Imports). For a given year, the model will take the lower of the two Supply and Demand aggregates as the level of production and calculate the difference between the two to determine spare capacity in the economy.

Spare capacity allows a quick supply response (not costly in terms of inflation) when aggregate demand is stimulated. Producer prices are thus not just determined as a cost-based pricing equation: changes in producer prices will depend positively on a mark-up process over unit labor cost and negatively on changes in existing spare capacity in the economy. Hence all the other prices but that of imports (consumer, investment and export) in the economy are influenced by spare capacity as they are all partially determined by production prices.

A number of other variables are taken as exogenous in the model. These divide into two categories: those subject to policy control; and those that lie outside such policy control. The policy variables include those related to fiscal and monetary policy, such as government employment and other items of recurrent expenditure, government investment, and the discount rate as set by the Reserve Bank. These policy-related variables may be treated differently across the frameworks. Additional exogenous variables include the gold price, gold production, some socio-economic variables linked to domestic social stability, world inflation, and income growth in the industrialized countries. The growth of population and that of the various categories of the labor supply are also exogenous (although subject to the influence of policies in the long-run). These are assumed to have identical time paths in all scenarios. Once the future values for all exogenous variables are set, the model then solves for the time paths of the endogenous variables listed.
Figure A.3: Simplified Diagram of the Nominal Economy in the SAMM
Figure A.4: Simplified Diagram of the Labor Market in the SAMM
## 2. Central Econometric Equations of the SAMM

### Table A.3a: Real Economy-Relative Factor Demand and Wage Equations

<table>
<thead>
<tr>
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<tr>
<td>Equation [1].</td>
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<tr>
<td>(KNG/LNGUNS)</td>
<td>RNWE</td>
<td>-0.177</td>
<td>-2.83</td>
<td>1964-1992</td>
<td>1.52</td>
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<tr>
<td></td>
<td>(KG/KNG)(t-1)</td>
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<td>(PEXNG/PIM)(t-2)</td>
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<td>(Q/LNGSK)</td>
<td>RQWRE</td>
<td>-0.113</td>
<td>-5.17</td>
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<td>RCWUNS</td>
<td>RCWUNS(t-1)</td>
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<td>9.01</td>
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<td>UNUNS</td>
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<td>NSTRIKE</td>
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<td>RCWSK</td>
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<td>(GDPNG/LDSK)</td>
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### Table A.3b: Real Economy-National Accounts Equations

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<td>Student Stat.</td>
<td>Durbin-Watson</td>
<td>R Squar.</td>
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<td>[5a]</td>
<td>(IPRNOH/KPRNOH)</td>
<td>[5b]</td>
<td>Log-Linear</td>
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Table A.4: Price Equations

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<td>PP(hat)</td>
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Table A.5: Taxes, Public Expenditures and Interest Rate Equations

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<td>[40a]</td>
<td>DTAXH</td>
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<td>[40b]</td>
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<td></td>
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<td>rhol=0.11</td>
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<td>2.25, -1.93, 1.63, -7.06</td>
<td>1960-1992</td>
<td>1.69</td>
<td>0.95</td>
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<td>[43]</td>
<td>INCPROH</td>
<td>Log-Linear</td>
<td>2SLS (AutoCorr=First Order)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INT(t-1), OPSTOT, CONSTANT</td>
<td>0.580, 0.884, 1.672</td>
<td>2.71, 7.67, 1.29</td>
<td>1964-1992</td>
<td>1.89</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29 observ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>rhol=0.72</td>
<td>(5.65)</td>
<td></td>
</tr>
<tr>
<td>[45]</td>
<td>INTTB</td>
<td>Log-Linear</td>
<td>2SLS (AutoCorr=None)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INT(t-1), INTDR, DIFINF(t-1), CONSTANT</td>
<td>0.493, 0.495, 0.003, -0.053</td>
<td>4.02, 3.89, 1.66, 5.10</td>
<td>1960-1992</td>
<td>1.71</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33 observ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[45]</td>
<td>INT</td>
<td>Log-Linear</td>
<td>2SLS (AutoCorr=First Order)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(DCTOT/GDPC)(t-1), INTDR, CONSTANT</td>
<td>0.162, 0.589, -0.323</td>
<td>2.74, 9.34, -2.58</td>
<td>1965-1992</td>
<td>1.86</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28 observ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>rhol=0.11</td>
<td>(0.60)</td>
<td></td>
</tr>
</tbody>
</table>
Data Sources for the SAMM

The SAMM was estimated using the South Africa Reserve Bank Quarterly Bulletin Data. Both the National Accounts data and the Financial Account data were used. The International Monetary Fund's IFS data were used for industrial production and inflation in industrialized countries.

Employment and wage data were taken from two sources. Data for recent years are from the CSS annual publication, 'South African Labour Statistics' (1991), and subsequent Statistical News Releases. Data before 1985 are from the Southern Africa Labour Development Research Unit (SALDRU). The standardized employment series as published by the CSS and used in this study were compiled by Roukens de Lange and van Eeghen (1990). There are no all-economy, non-government wage series on South Africa. Wage rates in manufacturing are used in the analysis. These series behave similarly to the series on wage rates in the non-primary sectors as compiled over recent years by the CSS. The same two sources are the basis for data on strikes and prosecutions under African mobility control laws.
3. Production, Labor Demand and Employment

The interpretation of the growth process and how to model it in South Africa are central to the approach of the SAMM because the two main problems that the new Government has to tackle are structural (non-cyclical) unemployment and inequality in income distribution. Thus, the interpretation of how production factors can be combined efficiently to generate output and wealth accumulation and what (realistic) assumptions can be made regarding their remuneration and its relation to factor productivity are central to the future analysis. Our starting point is that a supply-constraint was necessary in the SAMM to enable any meaningful treatment of long-run sustainable growth paths because of the unrealistic conclusions that simple Keynesian or demand-driven models may reach when removed from their short-term context.

The Two-Level CES Production Function in the SAMM

Our approach in the SAMM departs from the observed disequilibrium in the labor market. As Fallon [1992] points out, in South Africa there were simultaneously excess supply of unskilled labor and rising real wages (at least till the end of the 1980s), and shortages of skilled labor (at least until before the 1989-1993 recession).

The model attempts first to explain the behavior of wage rates and factor (that is skilled and unskilled labor and capital) employment levels over the period 1960 to 1992. Throughout the analysis, employment levels among both government employees and domestic servants are treated as given, and are excluded from the employment categories described. As explained in Fallon [1992] the model uses the four racially-based employment groupings as identified in South African wage and employment data as the basis of the empirical analysis and regroups them into two groups. For instance, Asians and Coloreds, are combined with Blacks to form a single group. A central
assumption is that, given substantial disparity between skill levels across races, racial employment categories are a useful proxy for more general skill categories. The notation used in describing the model and subsequent empirical results reflects this assumption. The two labor types identified are: UNS -- unskilled labor as measured by African employment and Asian/Colored employment; and, SK -- skilled labor as measured among whites. The corresponding money wage rates are defined as WMAUNS and WMA_SK, respectively.

To model further the factor demand side of the economy, one must specify the underlying production relationship. Estimation by Fallon of labor demand equations derived from a Cobb-Douglas production function yielded implausible, though statistically-significant, values for relevant parameters. So this approach was abandoned. We followed the experiments that were tried before with alternative Two-Level CES production functions. Given three factors, Z₁, Z₂, and Z₃, this function may be written as:

\[ Y = TFP \left[ \beta \left( \alpha Z_1^{\rho_1} + (1-\alpha) Z_2^{\rho_2} \right)^{\frac{\rho_3}{1-\alpha}} \right] \]

where Y is GDP net of government, and TFP is an efficiency parameter (total factor productivity). In this example, Z₁ and Z₂ are contained in single CES aggregate that is, in turn, nested within a further CES function. Three possible specifications depend upon whether Z₁ (as above), Z₂, or Z₃ is the "odd man out". Initial experiments by Fallon with the relevant factor demand equations indicated that the most promising specification in the South African context was Z₁ = KNG (the capital stock exclusive of central government property) ; Z₂ = LNGUNS (unskilled labor) and Z₃ = LNGSK (skilled labor) (see Equation [3]):

The factor demand equations can now be constructed in stages. The relative demand for KNG and LNGUNS is given by Equation [1] in the SAMM:

\[
\left( \frac{K_{NG}}{L_{NGUNS}} \right) = (\Theta_{KL}).RNWE^{\tau_2} \left( \frac{K_G}{K_{NG}} \right)^{\tau_3} \left( \frac{P_{EXNG}}{P_M} \right)^{\tau_4} \]

\[
t_{(t-1)}
\]
where: the elasticity of substitution between \( K_{NG} \) and \( LNGUNS \) is \( \sigma_2 = \left( \frac{1}{1 - \tau_2} \right) \); and RNWE is the relative factor cost (the real user cost of capital over the real product wage). The CES aggregate of \( K_{NG} \) and \( LNGUNS \) may be constructed as:

\[
Q = \left( \alpha . K_{NG}^{\rho_2} + (1 - \alpha) . LNGUNS^{\rho_2} \right)^{\frac{1}{\rho_2}}
\]

The corresponding rental price of the CES aggregate \( Q \) is given by:

\[
RQ = \frac{[(RUCK . K_{NG}) + (RWUMAP . LNGUNS)]}{Q}
\]

where \( RUCK \) is real user cost of capital and \( RWUMAP \) is the real product wage of \( LNGUNS \).

The next factor demand equation may be constructed analogously. The relative demand equation for \( Q \) and \( LNGSK \) is given in Equation [2] of the SAMM:

\[
\left( \frac{Q}{LNGSK} \right) = (\theta_{QL}). RQWRE^{\mu_2}. \left( \frac{K_{NG}}{K_{NG}} \right)^{\mu_3}. \left( \frac{P_{ENG}}{P_{IM}} \right)^{\mu_4}
\]

where \( RQWRE \) is the relative factor cost (the rental price of \( Q \) over the real product wage of skilled labor).

This can then be used in the construction of the Two-Level CES production function. The function with the efficiency parameter is Equation [3] in the SAMM:

\[
Y = TFP(0) \left[ \beta . \left( \left( \alpha . K_{NG}^{\rho_2} + (1 - \alpha) . LNGUNS^{\rho_2} \right)^{\frac{1}{\rho_2}} \right)^{\rho_3} + (1 - \beta) . LNGSK^{\rho_3} \right]^{\frac{1}{\rho_3}}
\]
and the efficiency parameter (TFP) can be estimated as the ratio between actual non-Government output GDPNG and Y. The important assumption used in the SAMM to define the production frontier is that potential output or Yp (the level of output at the production frontier) will be each year output obtained using the highest possible TFP over the 1960-1992 period and full employment of skilled labor (defined as the level of employment of skilled labor when unemployment of skilled labor reached its minimum over the 1960-1992 period. Yp is given by Equation [4] in the SAMM:

\[
Y_p = \text{TFP}_{\text{Max}} \cdot \beta \left\{ \left( \alpha \cdot \frac{K_{NG}^{\rho_2}}{(1 - \alpha) \cdot L_{\text{GUNS}}^{\rho_2}} \right)^{\frac{1}{\rho_2}} \right\}^{\rho_3} + (1 - \beta) \cdot \left\{ L_{\text{FULL}} + L_{\text{CASKUP}} \cdot (1 - UN_{\text{PROP}}) \right\}^{\frac{1}{\rho_3}}
\]

Following the calculation of Yp, spare capacity (SPCAP) in the economy would be defined thus by the difference between potential and actual output (as a ratio to potential output).

Finally, the SAMM provides for each relative factor demand equation given, the corresponding absolute value for each factor. Both LNGUNS and LNGSK are fully determined when both KNG and Q are calculated.

**The Econometric Results**

From previous work on the subject, it became clear that the relative factor demand equations needed further modification before a fully satisfactory empirical fit could be obtained. It was noted through tests of structural parameter shifts, that the estimated distribution parameters, \( \alpha \) and \( \beta \), displayed a clear upward tendency over time; that is, there was an unexplained tendency towards increased capital-intensity. Assuming that this reflects structural shifts within the economy, such as strategic investment associated with growing economic isolation, and the declining importance of agriculture, it is plausible that this structural shift would be associated with a deterioration of the external terms of trade or the relative importance of Government investment in capital-intensive undertakings or both. Thus, the logarithm of the non-gold terms of trade (PEXNG/PIM) and that of the
share of Government capital stock to total capital stock (KG/KNG) were experimentally added as explanatory variables. Both proved to be of some significant influence. The explanatory variables were included in an "expectation" format, that is, as the OLS estimate of an auto-regressive form of their current on their three-times lagged values. This is a standard procedure when estimating factor demand equations, particularly where decisions regarding the employment of capital stock are concerned. This procedure is preferable to the alternative of including a lagged dependent variable, given a marked unevenness in the lagged response.

The fitted equation corresponding to Equation [1] is (value of the Student t-tests are indicated below the value of the estimated coefficients)

Method=OLS. Autocorrelation adjustment = None

\[
\log\left(\frac{K_{NG}}{L_{NGUNS}}\right) = -0.18 \cdot \log(RNWE) - 1.17 \cdot \log\left(\frac{P_{EXNG}}{P_{DM}}\right)_{(t-2)} + 0.73 \cdot \log\left(\frac{K_{G}}{K_{NG}}\right)_{(t-1)} + 9.30
\]

\[DW = 1.52; R^2 = 0.95\]

In this equation, the estimated elasticity of substitution between \(K_{NG}\) and \(L_{NGUNS}\) is equal to 0.18, comparable but a little lower than the estimate of 0.24 in Fallon [1992]. The next step is to calculate the estimated series for \(Q\), \(RQ\) and \(RQWRE\) as indicated.

Moving on to Equation (2), the fitted equation is

Method=OLS. Autocorrelation adjustment = None

\[
\log\left(\frac{Q}{L_{NGSK}}\right) = -0.11 \cdot \log(RQWRE) - 0.34 \cdot \log\left(\frac{P_{EXNG}}{P_{DM}}\right)_{(t-2)} + 0.1 \cdot \log\left(\frac{K_{G}}{K_{NG}}\right)_{(t-1)} + 3.61
\]

\[DW = 1.36; R^2 = 0.93\]

Here, the estimated elasticity of substitution between \(Q\) and \(L_{NGSK}\) is 0.11 -- a lower value than that obtained between \(K\) and \(L_{NGUNS}\), indicating that capital is more complementary with skilled labor than with unskilled labor. This confirms the conclusions previously obtained.
In both equations there is a clear common pattern. The results suggest that it takes decision-makers between 3 and 4 years to fully respond via investment behavior to relative factor price and product price stimuli. There is, however, a significant response in both equations within the current period, presumably reflecting the fact that decision-makers can make "last-minute" adjustments to their plans by altering employment levels.
4. Determinants of Investment

A general model\footnote{This part draws on Investment and Factor Demand, by P. Artus and P.A. Muet, North Holland, 1990, Chapter 2, page 43. We assume, of course, that it is desirable and possible to "model" investors' behavior contrary to the recommendations of J.M. Keynes [1936] to whom private investment is essentially volatile because any rational assessment of the returns on investment is uncertain. This makes unpredictable "animal spirits" of private investors the main driving force behind any private investment decision.} explaining Private Investment behavior in industrialized countries: income-accelerator or demand effect, relative prices effect and profits.

Investment equations in econometric models are extremely diverse. The econometric formalizations of investment (in which there is usually an implicit or explicit separation between market-influenced private investment decisions and politically-motivated public sector or Government investment decisions) distinguish between two sets of arguments: investment depends on changes in aggregate demand and on the relative prices of any variable input (capital and labor) or both. Those give rise to three types of investment models: first, the income-acceleration models relate investment (as an adjustment of the stock of capital) to the expected changes in aggregate demand; second, the "neoclassical" models derive investment demand from the maximization of profit under a production-function constraint, with a hypothetically perfect financial market; and third, profit models or, more generally, financial models in which financing conditions are decisive\footnote{The distinction between the three types of models, based mainly on their independent variables, though well suited for studying the variables' influence, is not the most adequate from the theoretical standpoint. For example, the profit model can represent either the influence of expected profitability on the investment decision assuming perfect inter-industry mobility of capital or the influence of available self-financing on the converse assumption of constraints on the loan-fund market. The expected profitability, in turn, can depend on a variety of factors (exchange rate policy.). Similarly, the models labeled as "neoclassical" in the literature most often correspond to highly divergent models of investment: some, which are described as "true neoclassical models", apply the standard assumptions of neoclassical general equilibrium (competitive market, Say's law); the others - in fact, the majority of empirical models - resemble what is called "effective investment demand", determined in particular by expected demand changes.}.

For the developed countries, the literature on the topic is comprehensive and covers both theoretical models (for example Jorgenson [1967], Artus and Muet [1990]) and empirical results (Abel [1980] and Artus and Muet [1990]). In most cases, the empirical specifications do not include firms' implicit profit maximization behavior (Tobin [1969]) but rather variables like expected profits.
(Fouquet and al. [1978]), financial risk (coming from Kalecki [1937]), business cycles and various measures of profitability and solvability (Malinvaud [1981]).

The starting point of investment models considers investment as an adjustment of the existing capital stock (firms compare expected profits coming from expansion with relative costs). However, the outcome of adjustment is subject to the current production technology and thus, the production function (which could be one of three kinds: putty-putty, putty-clay or clay-clay depending on the existing possibilities to modify the relation between factors of production once investment decisions are taken).

When corporate behavior is reduced to the maximization of pure profit, the various investment models (accelerator, "neoclassical", profits) can be described in terms of the hypotheses chosen for the functioning of the markets involved in the investment decision (neoclassical equilibrium, or equilibriums with rationing). With perfect competition and unrationed markets, corporate investment demand is solely determined by expected prices and costs. This model, which we refer to as "notional investment" demand or "true neoclassical model", is identified only under the restrictive assumption of diminishing returns to scale.

When firms perceive or expect a constraint on changes in demand for their output (the traditional Keynesian hypothesis), investment demand becomes a function of expected output growth (acceleration effect noted \( \dot{GDP} \)) and -- depending on the value of the production function's elasticity of substitution -- a function of the relative cost of capital. The "effective demand" model defined corresponds to what is generally called -- the "neoclassical" model.

Finally, when the firm's indebtedness capability is limited, either because the credit supply itself is limited (credit-restriction period) or because the solvency constraint puts a ceiling on new debt, investment demand depends on the financing capability -- particularly on cash-flow resources.

Putting aside the "true neoclassical model", which rests on largely unrealistic hypotheses, we see two sorts of determinations of private investment behavior based on: the growth of demand and relative factor costs in the absence of financial constraints (the Hall and Jorgenson [1971] tradition; financing conditions on the contrary assumption (other parameters fixed).
By considering that financing constraints do not affect all firms, Artus and Muet [1990] proposed a general specification of investment decisions for macroeconomic models that simultaneously incorporated the acceleration effect \( (\hat{GDP}) \), the relative capital-labor cost (RUCK or Real User Cost of Capital over RWUMAP or Real Product Wage), \( \left( \frac{RUCK}{RWUMAP} \right) \) and the influence of profits \( (\Pi = \text{ratio of net savings over Capital Stock}) \). This general model subsumes, as special cases, the main econometric models of investment. The general model (where \( \Phi_i(L) \) represents a polynomial expression of degree L of the lagged variable \( i \)) is usually estimated in growth rates specification - noted here with the subscript hat ^\( \text{~} \) and is:

\[
\left( \frac{I}{K} \right) = \alpha_1 \Phi_1(L) \hat{GDP} + \alpha_2 \Phi_2(L) \left( \frac{RUCK}{RWUMAP} \right) + \alpha_3 \Phi_3(L) \hat{\Pi} + \Theta_{(1/K)}
\]

Estimating investment equations contributes to the evaluation of the elasticities of substitution between factors of production (for example, the possibilities of modification of the production technology) and also to the assessment of the time-lag of investment responses to domestic demand shocks. For example, in most of the French macroeconomic models 3, the elasticity of substitution between capital and labor (for putty-putty production functions) is relatively small and the time-lag for a full income-accelerator effect is about 3 years.

Models 4 explaining Private Investment in developing countries: the role of distorted markets and prices, shortages and uncertainty.

The literature on investment modeling for the developing countries is less comprehensive. However, for practical policy reasons it is important to know whether investment decisions in developing countries respond to the same sort of macroeconomic variables and belong to the same

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2 Like DMS (Modele Dynamique Multi-Sectoriel) or Metric, see *Modélisation Macroéconomique*, by P. Artus M. Deleau and P. Malgrange, Economica, Paris (1986), Chapter 4, page 81.

theoretical models applied in the industrialized world. For instance, very early in the literature of gap-models (H. Chenery and M. Bruno [1962]) it was held that financial constraints should be more important. In developing economies where domestic and foreign capital goods are complementary, short-term growth and investment would be affected by foreign exchange distortions and shortages (see E. Bacha [1984]).

In their survey on the relation between Macroeconomic Adjustment and Private Investment, Serven and Solimano [1993] show that the correction of large macro imbalances through adjustment has not improved the response of private investment. They point out that these results are difficult to explain in the context of conventional investment theories. This pessimism can be moderated. There are elements in the conventional models of investment that would help to explain the slow response of private investment under the adjustment process: for instance, some of the contractionary effects of adjustment packages or changes in the levels of interest rates -- when more restrictive monetary policy is put in place -- would certainly affect investment negatively.

It is more difficult is to assess the combined and short/long-term effects of reductions in fiscal or BOP imbalances through cuts in public expenditures or adjustments in the real exchange rate. It would be difficult econometrically to separate firms that are winners from losers in the process and obtain statistically significant results that could apply to only investment aggregate. The pure theoretical models described here can only be useful to less-developed economies when additional variables are added to the framework.

Rama [1993] constructs an integrative framework that incorporates the traditional variables explaining investment (demand and relative prices) but also adds variables typically encountered in less-developed economies (financial repression, foreign exchange shortages and distortions, complementarity with public investment and economic instability). He surveys and compares the results of 31 empirical studies dealing with the determinants of private investment in developing countries.

"Even in countries that made substantial progress in correcting imbalance and restoring profitability -- often through drastic cuts in real wages -- the effect on private investment has been weak and slow to appear." Op. Cit. page 11.
The results of the comparison suggest: that aggregate demand is an important variable with always a positive and significant coefficient (thus casting doubts regarding the validity of the "true neo-classical model" with no income accelerator for developing economies); that the effect of public investment is ambiguous because both crowding-out and crowding-in effects (positive externalities emerging from complementarities) can be found in the empirical studies; that relative factor prices are very often not taken into account or sometimes replaced in the empirical studies by proxies (real interest rates, user cost of capital, unit labor cost.) that are rarely significant; the availability of credit or foreign exchange is often measured in misleading ways (actual ex-post credit allocations instead of measures of availability) which bias the inferences from such equations; and finally, economic instability is almost exclusively represented through dummies and not via an appropriate analysis of uncertainty and credibility of policies.

Much of the literature insists on uncertainty as explaining the slow response of private investment to adjustment. Two trends can be seen here: an extensive literature on adjustment points out that macroeconomic stability (low domestic and external imbalances) is a necessary (but not sufficient) condition for growth and thus investment (see Fisher [1992] and World Bank [1989], [1990] and [1992]). Other studies emphasize the notion of credibility of macro policies and the role of uncertainty and external shocks in shaping cyclical macroeconomic behavior that influences private investment. Solimano [1989] argues that macroeconomic instability (sharp cycles of fluctuation in economic activity) discourage private investment and that, in addition to the usual variables, private investment functions should include measures of this instability. Macroeconomic instability is also captured by the misalignment of some cost, price and output variables. For instance, profitability can be distorted by an overvaluation of the exchange rate which can cause an abnormal decrease in the replacement cost of capital. That, in turn, can give rise to an outburst of investment but not necessarily in the most "productive" sectors of the economy. A profitability index can be estimated before the investment equation using the real exchange rate and some measure of the returns to investment (corporate savings over capital stock) and included in the investment function. Alternative profitability measures are possible here. In addition, the effects of cyclical behavior are

South Africa - Economic Performance and Policies

captured by including the variance of some of the independent variables in the right-hand side of the investment equation.

Some previous equations used\(^2\) to explain Private Investment in South Africa.

In South Africa, a major issue is to quantify the behavior of private investment in a volatile political and economic environment. Several different approaches have so far emerged:

- First, a normative and non-econometric formalization of determinants of private investment emphasizes the need for microeconomic incentives to ensure the revival of private investment in the industrial sector (see CEAS [1993] pp. 90-103). This approach focuses on the amount of net fixed investment needed to satisfy a targeted GDP growth rate under assumptions on the incremental capital-output ratio (ICOR), total factor productivity, the depreciation rate and the capital intensity in the economy. This normative approach derives essentially from Solow [1956], [1957]. The CEAS implicit investment equation is derived from the differentiation with respect to time of a general two-factor production function with autonomous technical progress (where A is the autonomous technical progress, K the stock of capital, L labor, dots denote derivatives with respect to time and subscripts denote partial derivatives). Gross fixed investment is calculated as that required to achieve a given growth rate under assumptions regarding the other sources of growth. Knowing the GDP targeted growth rate, the rate of change in technical progress, the competitive shares of capital and labor and the depreciation rate $\delta$, net investment requirements are:

$$\left( \frac{\dot{K}}{K} \right) = GDI = \frac{\left( \frac{\dot{Y}}{Y} \right) - \left( \frac{\dot{A}}{A} \right) - \left( \frac{f_L L}{Y} \right) \left( \frac{\dot{L}}{L} \right)}{\left( \frac{f_K K}{Y} \right)}$$

$$I = GDI - \delta$$

\(^2\) The references here are: B. Kahn, A. Senhadji and M. Walton [1992], L. Pereira da Silva [1993], Central Economic Advisory Service (CEAS) [1993], Macroeconomic Research Group (MERG) [1993] and International Monetary Fund (IMF) [1993].
A second set of approaches do not set investment as a needed requirement to achieve a growth target. However, following the orthodox Keynesian tradition, they remain non-econometric and normative in the sense that they assume a rather market-insensitive behavior for private investors.

Finally, a third set of papers (Kahn, Senhadji and Walton [1992] and Pereira da Silva [1993] approached the problem econometrically although with some empirical specifications. The first paper combines an "effective-demand" specification for private investment, a measure of the popular Tobin's Q (TQ) as an explanatory variable summarizing relative prices, investment replacement costs and dummy variables to account for the post-1985 financial sanctions. The second paper tests the crowding-in hypothesis (positive influence of public expenditures on private investment) through an adapted "effective-demand" specification. The two specifications are written below. The results show positive and significant income-accelerator effects (an elasticity to output higher than one in the first case and an elasticity of investment to public expenditures equal to one in the second case).

\[
I_{PRn} = \Theta_{IPR} \cdot Y_{PRn}^\alpha \cdot TQ_{(t-1)}^\beta \cdot DUMMY85^z
\]

\[
\left( I_{PRNOH} \right) / \left( K_{PRNOH} \right)_{(t-1)} = \left( I_{PRNOH} \right) / \left( K_{PRNOH} \right)_{(t-1)} \cdot \left( \Delta G_{(t-1)} \right)^\alpha \cdot \left( \Delta C_{(t-1)} \right)^\beta \cdot P_{K} / CPI_{(t-1)}^z
\]

**Econometric Results of Private Investment equations in the SAMM**

Our analytical work on investment behavior in South Africa tries to disentangle the impact of domestic economic factors from exogenous shocks in explaining investment behavior. We wanted to build a macroeconomic investment function whose arguments were solely economic variables. Without minimizing the effect of unpredictable exogenous shocks (political uncertainty), we tried to avoid using dummy variables even when acknowledging political disturbances.

The starting point was to disaggregate investment and the relevant variables (capital stocks) by economic agent. Four agents are considered: the Government, the parastatals, the households and the private corporate firms. For the latter two, a further disaggregation was needed between housing and non-housing investment (and capital stock) and financial and non-financial investment.
General Government Investment

General Government Investment \((I_G)\) is taken as exogenous or purely driven by political considerations. This seems a good approximation of past Government's investment policies. For the projections of the model, normal \((I_G)\) grows at the population rate (2.5%/year). In addition to \((I_G)\) and its "normal" growth rate, the Government can increase the level of Government's investment expenditures by an amount defined by another exogenous variable \((DEMSHO_{IG})\).

Investment by Parastatals

Investment by Parastatals \((I_{PAR})\) is seen as driven more by economic considerations though there is a perception in some quarters in South Africa that this type of investment was and is still very much driven by political considerations (examples of politically-driven investment by parastatals are widespread in South Africa). However, the present exercise models \(I_{PAR}\) as being closer to Private Investment behavior than to Government Investment behavior. \(I_{PAR}\) tends to be driven more by expected demand (accelerator effect) than by price or relative price considerations like the investment behavior of a purely private firm. Khan and al. [1992] indicate for \(I_{PAR}\) a relation incorporating a demand effect (GDP growth), the relevant relative price of capital for the Public Sector and a measure of capacity utilization in the Government sector. We believe that the demand effect (accelerator) is important in the determination of this component of public investment.

However, the econometric results of equations including cost considerations are unsatisfactory. As in other equations of the SAMM, what seems to matter is some indicator of the structural shifts in the South African economy toward more capital-intensive investments or some indicator of the financial risk of such operations. In that respect, we have chosen for the first indicator the non-gold terms of trade \((TT = P_{EXNG}/P_{IM}\), a proxy for structural shifts in South Africa's economy). For the second indicator we have chosen the ratio of inflation rates between South Africa (CPI) and the OECD countries (CPI\(_{IC}\)), taken as a proxy for a measure of portfolio risk (investing domestically against investing abroad).

The Equation [7] for Investment by the Public Corporations that was estimated is therefore:
Method=2SLS, Autocorrelation adjustment=First Order

\[ I_{PAR} = GDP^{2.33}_{(t-1)} \left( \frac{CPI}{CPI_{IC}} \right)^{-1.362}_{(t-1)} \exp(-11.895) \]

\[ DW = 1.44; \overline{R^2} = 0.78 \]

- Private Investment in Residential Building

Investment in residential buildings by households (I_{PRH}) is treated separately, as a particular case of a durable good consumption function. This component of investment is primarily done by households and depends: positively on their expected real disposable income (DRINC); negatively on the relative price of investment vis-a-vis consumption today (P_{INV}/CPI); negatively on some sort of measure of the expected maintenance cost of such purchase -- this is taken here as proportional to the prevailing real interest rate RINT in the sense that it is a measure of the minimum financial obligation to maintain the property. In addition, households have some portfolio optimization behavior: they are affected by the ratio of inflation rates between South Africa and the OECD countries (CPI/CPI_{IC}). This can also be taken as an indicator of macroeconomic/political instability. Results for Equation [6] are:

Method=2SLS, Autocorrelation adjustment=First Order

\[ I_{PRH} = DRINC^{1.016}_{(t-1)} \left( \frac{P_{INV}}{CPI} \right)^{-1.309}_{(t-1)} \left( \frac{CPI}{CPI_{IC}} \right)^{-0.371}_{(t-1)} \exp(2.128) \]

\[ DW = 1.37; \overline{R^2} = 0.96 \]

- Private (Non-Residential Building) Investment Behavior.

Private Investment other than residential buildings is one of the most important variables of the SAMM because it commands the generation of non-Government employment (through the increase in the stock of capital) and hence the generation of wage income (and thus, private consumption, the largest macro aggregate).
Following previous work on the subject, and a number of other possible specifications that were tested successfully (including equations with a profit rates, crowding-ins by public investment and public consumption), we simplified the equation to match the "effective demand" specification with both a cost and a profit effect. In Equation [5a.], the expected demand or accelerator effect is captured by the GDP growth rate; the cost effect is reduced here to the real interest rate (RINT); and the financing conditions are assumed here to be captured by the aggregate ratio of corporate savings over income (Π). Finally, a lagged-dependent variable was included to capture the inertial effect of investment decisions in an economy that has been showing since the mid-1970s signs of long-term decline in its investment-to-GDP ratio and was experiencing a severe 5-years recession. The results are:

Method=2SLS. Autocorrelation adjustment=None

\[
\begin{align*}
\frac{I_{PRNOH}}{K_{PRNOH}} &= 0.190 \cdot GDP_{t-1} - 0.144 \cdot RINT_{t-2} + 0.130 \cdot Π + 0.741 \left( \frac{I_{PRNOH}}{K_{PRNOH}} \right)_{t-1} + 0.039 \\
DW &= 1.58; R^2 = 0.83
\end{align*}
\]

The equation shows that there will be some adjustment to changes in aggregate demand through a small (about a fifth of the past-year GDP growth rate) but significant accelerator effect. It also tells us that private investors are sensitive to the conditions prevailing in financial markets and respond (though with a lag) to increases in the real interest rate by deferring or postponing investment decisions. In that sense, it confirms the results of a tight interest rate policy in the recent recession. Another interesting feature of the equation is that we wanted explicitly to make the distribution of factor remuneration matter. We thus include a profit variable that captures the split between wage remuneration and firms' savings. Figure A.5 shows (left scale) the shares of paid wages and operating surplus in the firms' net revenue (gross revenue net of depreciation); and (right scale) the "profit rate" and investment-to-GDP ratio. From the Figure and the equation's results, it is clear that the distribution of factor rewards has a limited (about a tenth of a change in the savings rate) but significant effect on private investors' behavior. As expected, wage pressure will tend to lower investment as it decreases the rate of profit; although, it also contributes to increase aggregate demand.
As one can see by inspecting the results of Equation [5], given the high coefficient for the lagged-dependent variable it would take about 5 years before the effect of policy-variable changes is fully taken into account by private investors. The length of this adjustment made us consider for simulation purposes two types of situations. First, one can follow entirely the estimated private investment equation and let it exclusively drive the supply response to policy changes. Second, one can also imagine a more rapid supply response to the changing political and economic circumstances. In that case, an "additional" variable (DEMOSHPRV) will be positive or negative on top of the estimated equation. As one can see, our approach is not entirely consistent with the choice of our production function in the sense that we use it to determine both our supply frontier and the demand for labor but not the demand for capital (and thus investment) nor the factor pricing equations (since we have other equations in the SAMM for determining these absolute factor prices). One reason for this is purely practical --using the highly non-linear two-level CES for that purpose would increase the existing difficulties in solving the SAMM--; the second reason is that we would have fewer policy instruments for our scenario simulations.

Figure A.5:

![Graph showing profits, wages, and private investment over time.]
5. Private Consumption

Models for Private Consumption.

Private consumption is usually modelled in most macro-econometric frameworks as a function of two major variables: income and wealth. Additional effects are sometimes introduced to take into account the results of inflation and precautionary savings.

Income is always present in private consumption equations, usually in a dynamic specification to take into account the classical hypothesis on permanent income (Friedman [1957]). Real income is certainly the most important determinant of private consumption in the short-term. Even in fairly aggregate models, it is useful to distinguish between the various components of income, such as wage and profits, each being associated with a different propensity to consume.

An important part of the literature has tested the effect of changes in income distribution (essentially the split between profits and wages) on aggregate consumption. The underlying idea here is that any movement that changes the shares of profits and wages will change the average propensity to consume in the economy. However, to stabilize the consumption function, it is admitted in the long-term that the elasticity of consumption with regard to real income should be 1 (Duesenberry [1949]).

Wealth hypothesis appears usually when the equation incorporates a life cycle effect (see Ando, Modigliani [1963]); and (Feldstein [1974]) and includes the impact of accumulation of pension funds. This holds true when the effects of inflation must be taken into account: when some of its components (such as specific assets) are not perfectly protected against inflation by some sort of indexation, this could lead to additional savings (and thus reduction in consumption) to maintain the real value of these assets. However, an acceleration of inflation could also have the opposite effect: inflation could force immediate consumption when goods are perceived as more difficult to purchase in the next period.
Precautionary savings may occur when uncertainty regarding future revenue forces households to save (such as when there is rising unemployment, or a high degree of political uncertainty).

The Private Consumption Equation in the SAMM.

A number of experiments were tried for the SAMM to confirm the influence of wage income. One option would have been, of course, to derive the real disposable income (NDI/CPI) directly from the National Accounts identities and not from the wage income generated in the Household account of the SAMM. We therefore tested the following equation where both real national disposable income and the share of wages on gross domestic product appear as explanatory variables. This gave the following results, showing that wage income is positive in determining private consumption:

Method=2SLS; Autocorrelation Adjustment=First Order

\[
CP_{PR} = -36519.2 + 0.529 \left( \frac{NDI}{CPI} \right) + 72.56 \left( \frac{WMAINS, LINS + WMA, LSK}{GDP_{FC}} \right)
\]

\[
DW = 1.92; \bar{R}^2 = 0.99
\]

To test the effect of wage policies in our simulated scenarios, we preferred to calculate real private disposable income (DRINC) from the household account and not use national disposable income from the National Accounts. Economic and political uncertainty is probably a powerful factor in South Africa in defining consumption patterns: it is captured here by both a "financial sanctions post-1985 dummy" (DUMSANC) and by the percentual change in the inflation differential between South Africa and the industrialized world (CPI/CPIiC). Precautionary savings are captured by including the percentual change in the unemployment rate for the unskilled labor (UNUNS) and the percentual change in the real interest rate (RINT). The estimated Equation [16] of the SAMM is:

The DRINC (the CPI is used as a deflator) includes revenue accruing to private entrepreneurs whose firms are unincorporated but whose consumption is not included in CPR. This minor statistical inconsistency makes the calculated marginal propensity to consume slightly above 1 in the long-run, and not strictly equal to 1.
Method=2SLS; Autocorrelation Adjustment=First Order

\[ C_{PR}^* = 0.693.C_{PR}(t-1) + 0.321.DRINC \]
\[ -165.7.RINT(t-1) + 21113.8. \left( \frac{CPI}{CPIIC} \right)_{(t-1)} \]
\[ -17782.1.UNS - 2494.0.DUMSANC \]
\[ DW = 1.61; \bar{R}^2 = 0.99 \]

Private Consumption and Savings.

Another approach for the SAMM (not taken here) could have been to model savings directly and take consumption as the residual.

Figure A.6:
Private savings have always accounted for the bulk of South Africa’s gross savings although the public sector (government, public business enterprises, and public corporations) has always maintained a positive level of gross savings that has fluctuated around 5 percent of GDP. Leaving aside the sharp rise in the savings rate during the post-war recovery period, the basic features are: a slow rise in ratios of both private and total savings to GDP from the early 1950s to the late 1970s; a subsequent "leap and fall" in these savings rate that seems closely related to movements in the gold price during the late 1970s and early 1980s; and a fall in the private savings-to-GDP rate over the second half of the 1980s partly offset by a rise in public savings. In view of the runaway fiscal deficit of 1992-1993, it is likely that the pattern is changing again.

Private savings respond not to changes in GDP as such, but rather to changes in disposable private income. The latter may be defined as gross disposable income in the economy as a whole, less government consumption and the gross savings of government and the parastatals defined. It is then identically the case that disposable private income, less private savings, must equal private consumption. Real private disposable income is likely to move positively with changes in the external terms of trade even if real GDP remained constant. Suppose no inflation in consumer prices while nominal GDP rose by 10 percent given a sharp rise in the price of gold. Real GDP would, by assumption, remain constant. However, if private disposable income were initially equivalent to (say) 80 percent of GDP, then its real value as measured in consumption equivalent would rise in the ratio of 90/80. Suppose further that the ratio of private savings to private disposable income were constant, then the observed ratio of both private savings and consumption to GDP would correspondingly rise.

---

2 One has to be very careful in interpreting the savings data as given in different parts of the national accounts and in the flow of funds data (national financial accounts) as given in the Reserve Bank Quarterly Bulletin. Ideally, there are five institutional subdivisions over which one might like to have separate savings data: government; public business enterprises; public corporations; private corporations; and households. This breakdown is not available, however, over a long period. In the national accounts, savings as attributed to general government are actually those of public authorities and include those of public business enterprises (e.g. SATS and the Department of Posts and Telecommunications). It is, however, possible to identify gross savings for public authorities for every year. Net savings are only given for public authorities, the corporate sector (private & public), and households. Depreciation is given for public authorities, public corporations, and the private sector (private corporations plus households). To break gross savings down by type of institution, one has to combine the national accounts information with that of the national financial accounts (NFA) which gives both net savings and depreciation by government, the public sector, private corporations and by households. Here, however, government is narrowly defined, while the "public sector" encompasses both public business enterprises and public corporations.
Private savings does indeed show a less pronounced movement relative to private disposable income over time in South Africa than relative to GDP. For example, during the violent changes in the gold price during the late 1970s and early 1980s, the saving-to-private-disposable income ratio fluctuated between 0.32 and 0.21 while the corresponding ratio to GDP varied between 0.35 and 0.19. Nevertheless, the variation of private savings relative to private disposable income is considerable.

There have also been shifts in the composition of private savings over the years. There has been a pronounced movement away from savings by households towards savings by firms. Before 1975, for example, both household and private corporate saving fluctuated around 10 percent of disposable income. By 1990, the ratios had diverged to 6 percent and 16 percent respectively. Although this shift towards corporate saving has been highlighted in the South African literature, it has not been satisfactorily explained. Clearly, the absence of a capital gains tax makes it advantageous for a shareholder to obtain returns via the increased value of equity rather than through receipt of taxable dividends, but what prompted the shift in the composition of private savings over this period remains unclear. The other major shift has been away from discretionary saving towards contractual savings arrangements such as through private pension and provident fund schemes. A preference for contractual arrangements seems easy to explain: pension funds are exempt from taxation on dividends and interest received and can consequently offer attractive terms to contributors. The rise in the importance of pension and provident fund schemes in South Africa mirrors the experience of many developed countries and may reflect little more than a learning effect. The rise in the inflation rate is also likely to have increased the relative attractiveness of contractual savings arrangements, given the degree of inflation-proofing that such schemes offer.

A variety of different savings models have been explored of which only one is given here. In all cases, gross private savings deflated by the CPI ($SA_{PR}$) is the dependent variable. Gross disposable private income (also deflated by the CPI) ($GRNDI=GNDI/CPI$) is used as the relevant income variable, although this is sometimes broken into its estimated permanent and transitory components. A single equation is discussed here: a variant of the Koyck approximation to the permanent income model. The sample fitted equation is given by:

\[ \text{Sample fitted equation} \]
Method=2SLS. Autocorrelation Adjustment: First Order

\[ SAV_{PR(t)} = -0.914 + 0.728 \cdot SAV_{PR(t-1)} + 0.654 \cdot GRNDI_{(t)} - 0.588 \cdot GRNDI_{(t-1)} \]

\[ DW = 1.99; R^2 = 0.98 \]

In this equation, the short-run marginal propensity to save is 0.654. The long-run marginal propensity to save is, however, much lower at 0.243. This is entirely consistent with results obtained for similar equations in other countries, and indicates that the initial impact on savings of a positive shock would be quite pronounced in the first year, but, as indicated by the negative coefficient on the lagged income variable, would be substantially reversed during the second year.
6. Exports and Imports

Models for Exports and Imports.

The external sector equations (exports and imports) are usually modelled in most macroeconometric frameworks as functions of two major variables: income (domestic or foreign demand) and relative prices. Additional effects are sometimes introduced to take into account the effects of spare capacity and country-specific distortions.

Exports \((X)\) are usually seen as a function of both foreign demand \((Y_F)\) and the relative price \((P_{EX}/P_F)\) of the country's export price (this can be either the country's trade partners prices expressed in foreign currency --when the country is a price-taker--, or the country's producer prices expressed in foreign currency \((E.PP/P_F)\), or any geometrical average of the two) to foreign prices. In some cases an indicator of capacity utilization or spare capacity \((SPCAP)\) is used. A one-commodity aggregate export equation would typically be:

\[
X = Y_F \alpha \left( \frac{E.PP}{P_F} \right)^\beta SPCAP^\gamma, \alpha > 0; \beta < 0; \gamma > 0;
\]

Imports \((IM)\), in turn, are usually seen as a function of both domestic demand \((GDP)\) and the relative price \((P_{IM}/CPI)\) of the country's import price (that is usually the country's trade partners prices expressed in domestic currency \((E.P_F)\) --when the country is a price-taker--) to domestic prices \((CPI)\). A one-commodity aggregate import equation would typically be:

\[
IM = GDP^\alpha \left( \frac{E.P_F}{CPI} \right)^\beta SPCAP^\gamma, E.P_F = P_{IM}, \alpha > 0; \beta < 0; \gamma < 0;
\]

The theoretical background for these equations is not always entirely consistent. These equations are not strictly speaking derived from an equilibrium model of supply of/ and demand for/ (Goldstein and Kahn [1978]) both exports and imports (that would require a simultaneous treatment of quantities and price adjustments). The specifications used here are rather a mixture of demand...
specification (through the income elasticities) and of a disequilibrium approach (through the capacity utilization or spare capacity indicator).

Exports and Imports in the SAMM.

The SAMM used these specifications (without the inclusion of SPCAP which could not provide a good fit at this level of aggregation although showing good results for specific products -- see Annex B --) in the following variations:

In the export equation: gold exports were considered exogenous because of the specific nature of the market (prices are volatile and subject to very specific fluctuations; existence of a massive stock of gold representing years of production and held by Central Banks that can modify at will market price trends); thus, only non-gold exports ($X_{NG}$) were modelled; foreign demand is captured by the industrialized countries industrial production index ($IP_{IC}$) instead of GDP because of South Africa's composition of exports (essentially a high percentage of intermediate goods --gold and other minerals-- during the 1960-1992 period). Because of financial and economic sanctions, and to some extent the 1989-1993 recession, a 1985-1992 dummy was also used. Foreign prices are the wholesale price index of industrialized countries. Equation [17] of the SAMM is hence:

Method=2SLS; Autocorrelation Adjustment=First Order

$$X_{NG} = 2.069(IP_{IC})^{0.048} \left( \frac{P_{X_{NG}}}{WP_{IC}} \right)^{-0.333} DUMSANC^{-0.029}$$

$DW = 1.81; R^2 = 0.94$

In the import equation: imports of oil and similar products were also considered exogenous and their relative price elasticity was set to zero (as in many estimated relations for similar products in other macro models) while their elasticity to GDP was considered to be 1.01. Imports of non-oil and similar products were modelled similarly to exports but with one major modification. Often in macro models, when imports are modelled strictly as a demand equation, even with relative price effects, the demand elasticity tends to be in the range of 1.5 to 2. This poses a problem for the short-term stability of the trade balance when demand shocks or any demand-driven revival of the economy is
attempted (see Fournet, Muet and Villa [1982]). We introduced a trend to isolate the pure short-term demand effects from the structural long-term changes in the import composition of the economy. Equation [20] of the SAMM is:

\[ IMNO = \exp(-1.654) \cdot GDP^{0.708} \cdot \left( \frac{P_{IMNO}}{CPI} \right)^{-1.078} \cdot \left( \frac{P_{EX}}{P_{IM}} \right)^{0.742} \cdot \left( P_{IM} \right)_{(t-1)} \]

\[ DW = 1.92; R^2 = 0.83 \]
7. Prices and Wages

*Price and Wage Equations in Macro Models*

The approach is standard. Although most macro models have several explicit price equations, the critical one usually relates to the producer price in underlying economic assumptions. Usually, by combining the producer price with an exogenous import price (exogenous foreign prices times the nominal exchange rate), one can derive most of the other prices in the economy (the prices of consumption, investment and exports and thus all the nominal macro aggregates). The remaining prices (GDP deflator) must respect the national accounting identities in value terms and are therefore determined as the model's closure in nominal terms.

It is important that the central price equation be consistent with the hypothesis regarding agents behavior. For example, under a profit-maximization framework, the producer price equation should bear some relation with marginal costs. The traditional model is a system of determination of production prices (P) and wages (W) such as the following:

\[
\hat{P} = \alpha \left( \frac{\hat{W}}{Y} \right) + (1 - \alpha) \hat{E} + \phi \cdot SPCAP + \psi, 0 < \alpha < 1; \phi < 0
\]

\[
\hat{W} - \hat{P} = \chi \cdot \hat{P}_{(t-1)} - \lambda \cdot UNTot + \xi, 0 < \chi, \lambda
\]

\[
\hat{E} = \mu \cdot \hat{P} + (1 - \mu) \cdot \hat{P}_{(t-1)}, 0 < \mu < 1
\]

In such a framework (see Dornbusch and Fisher [1993]), there are: a cost-based inflation equation that makes prices dependent positively on both unit labor costs and changes in the exchange rate (E) and negatively on existing spare capacity in the economy, a Phillips type of wage-setting equation making real wages dependent on some sort of indexation mechanisms in the economy plus tension in the labor market (unemployment rate, UNTot); and an exchange rate rule that targets a fixed real exchange rate. In some cases, the wage equations also have productivity gains as arguments.
Price Equations in the SAMM

In the SAMM, the critical price equation is Equation [25a.] setting producer prices. These follow a mark-up process over unit labor costs but are also negatively influenced by existing spare capacity in the economy (as measured by the model’s production function). This is illustrated by Figure A.7 showing that decreases in capacity utilization precede producer prices declines and are also associated with falls in unit labor costs.

Figure A.7

The estimated Equation [25a] is:

\[
P^P = 0.435 P^P_{(t-1)} + 0.532 \ln \hat{Q} - 0.083 \ln \hat{PCAP}_{(t-2)} + 0.091 \ln DUMMY80
\]

\(DW = 1.91; R^2 = 0.83\)
The equation shows the two effects at work in determining producer prices. Prices are of course positively correlated with changes in unit labor costs (more than half of the change in unit labor costs is immediately transferred to prices), and negatively affected by increases in spare capacity. The equation confirms the likelihood of persistent moderate levels of inflation in South Africa through the coefficient of the lagged dependent variable and a two-years lagged response to changes in the capacity utilization.

Import prices are then derived directly from foreign prices through the exchange rate.

\[ P_{IM} = (E.P_{WF}) \]

The other prices of the demand aggregates (investment, exports, CPI) are constructed as rough geometric averages of other prices. Non-gold export prices depend on both foreign prices measured in domestic currency and domestic producer prices. Investment prices depend on the prices of the major components of investment (import prices for the imported capital goods and producer prices for the domestically produced ones). Finally, consumer prices depend directly on domestic producer prices and the price of imported consumer goods (here assumed to be identical to the general import price).

**Method=2SLS: Autocorrelation correction=First Order**

\[ P_{EX} = P_{EXG}, \left( \frac{X_{NG}}{X_{GNFS}} \right) + P_{GOLD}, \left( \frac{X_{GOLDK}}{X_{GNFS}} \right) \]

**Method=2SLS: Autocorrelation correction=None**

\[ P_{INV} = (P_{IM})^{(1-0.608)} \cdot (PP)^{(0.608)} \cdot (SPCAP)^{(-0.014)} \cdot Exp(0.033) \]

\[ DW = 1.43; R^2 = 0.88 \]
Method=2SLS; Autocorrelation correction=None

\[ CPI = (P_m)^{(1-0.921)} \cdot (PP)^{(0.921)} \]

\[ DW = 1.53; R^2 = 0.94 \]

**Wage Equations in the SAMM**

Two real (consumption) wage equations are estimated in the SAMM following a similar approach to Fallon [1992]: real wages of skilled and unskilled workers are separated. Both equations are estimated for specifications that are variants of a Phillips curve story.

The real consumption wage equation for unskilled workers contains four results as interpreted in the context of an efficiency wage model. First, that apartheid influx controls reduced the access of unskilled workers to urban informal sector opportunities. \( \text{APART} \) is the ratio of prosecutions under internal mobility control regulations as a ratio to employment of Africans. In an efficiency wage context, we interpret this result as indicating that employers had less incentive to use wages as a turnover deterrent as such controls inhibited informal sector alternatives and reduced mobility between employers. Second, an increase in the proportion of the unskilled labor force outside wage employment, \( \text{UNUNS} \), reduces the real consumption wage by decreasing the value of expected alternatives. Third, increased trade union activity, (here proxied by (the log of) strikes involving unskilled workers as a ratio to unskilled workers employment \( \text{(LNSTRIKE)} \)), raises wage rates above efficiency levels. Fourth, employers have felt under increasing pressure to raise African wages towards those enjoyed by skilled (white) workers. As a proxy for this effect, the log of the real consumption wage of whites workers was included as a fourth variable.

Experience of fitting wage equations shows that it is important to allow for wage dynamics. The lagged value of the dependent variable is included. The fitted equation [38a] is:
Method=2SLS, Autocorrelation adjustment = None

\[
RCW_{UNs} = \text{Exp}(-0.102). (RCW_{UNs})^{0.747}_{(0.28)} . (RCW_{sk})^{0.208}_{(2.1)} . UN_{UNs}^{0.329}_{(-1.42)} . NSTRIKE^{0.510-4}_{(1.2)} . APART^{-0.252}_{(-4.4)}
\]

\[DW = 211; R^2 = 0.99\]

The equation for the real consumption wage of skilled workers also takes a log-linear form, and, consistent with the bargaining framework, includes three explanatory variables. First, the log of non-government GDP expressed as a ratio to LNGSK is taken as the demand-side variable (productivity factor). This is consistent with the adopted two-level CES formulation. Second, we add the log of the proportion of the white labor force outside wage employment UNSK to control for the expected value of non-wage employment alternatives. Third, the lagged dependent variable is included to allow for adjustment dynamics as before. The fitted equation [38b] is

Method=2SLS, Autocorrelation adjustment = First Order

\[
RCW_{sk} = \text{Exp}(0.867). (RCW_{sk})^{0.744}_{(3.44)} . UN_{sk}^{-1.033}_{(-2.4)} . \left(\frac{GDP_{NG}}{L_{NGSK}}\right)^{0.309}_{(2.34)}
\]

\[DW = 1.50; R^2 = 0.98\]
8. Agents Accounts

The SAMM has four agents' accounts: households (including unincorporated firms), incorporated firms, Government and the rest of the world (the Balance of Payments). For each account the model calculates several items on both the revenue and the expenditure sides, and then takes savings as a residual.

**Households.**

In the households Account, income has two major components: wage income (deriving from the labor market block) which is the sum of nominal wages times employment levels and other revenue from property (determined econometrically (see below) as a function of both interest rates -- accounting for revenue from portfolio) and the firms' operating surplus (accounting for distributed profits--). Total income is thus the sum of wage income, income from property, transfers from Government to households (considered an exogenous policy variable) and other income items (exogenous).

\[
SALc = \Theta_{WMAUNS} \cdot (12.WMAUNS) \cdot LDUNS + \Theta_{WMANSK} \cdot (12.WMAISK) \cdot LDSK
\]

**Method=2SLS; Autocorrelation Correction=First Order**

\[
INC_{PROH} = \text{Exp}(1.672) \cdot \text{INT}^{(0.31)} \cdot \text{ORD}^{(1.19)} \cdot \text{OPS}_{TOT}\]
\[
DW = 1.89; R^2 = 0.75
\]

\[
INCc = SALc + INC_{PROH} + TRANS + INCOTH
\]

Disposable income of households is essentially income minus private consumption, direct income taxes paid to the Government and compulsory transfers (pensions, social security) made to the Government (50% is paid by the employers). Savings would therefore be the residual of the account:
\[ \theta = 50\% \]
\[ TSSC_H = \theta \cdot TSSC \]
\[ DINC = INC_c - DTAX_H - TSSC_H \]
\[ SAV_H = DINC - CPR_c - OTHHEX \]

**Firms.**

The Firms Account follows similar principles but is more complex because of its debt module. The firms operating surplus (\( OPS_F \)) derives from national accounts identities: it is equal to GDP at factor cost minus factor remuneration (wage income and the value of depreciation of the capital stock). Firms' income is therefore \( OPS_F \) plus interest payments received from firms and other income from property (one feature of the RBSA data is that the corporate sector data includes both financial and non-financial enterprises).

\[ GOPSTOT = GDP_{PCC} - SAL_c \]
\[ VDEP_{TOTC} = (DEP_{TOTC}) \cdot P_{INV} \cdot K_{(t-1)} \]
\[ OPS_{TOT} = GOPSTOT - VDEP_{TOTC} + \Delta INV_c \]
\[ OPS_F = \alpha \cdot OPS_{TOT} + \beta \cdot DUMID80S \]
\[ INC_F = \chi \cdot OPS_F + \epsilon \cdot DUMMY80 \]
\[ IPR_F = f(IP_F) \]
\[ INC_F = OPS_F + IPR_F + INC_{FPRF} \]

On the expenditure side, firms are similar to households except that they can accumulate debt and therefore pay interest on their stocks of domestic and foreign debt. Firms' debt is separated between domestic (FDDEBT) and foreign (FFDEBT) debt. Firms' foreign debt is estimated by subtracting Government's foreign debt (GFDEBT) from the country's total foreign debt (FODRD). It is assumed that households do not contract foreign debt obligations.
South Africa - Economic Performance and Policies

\[ PRE = PRE \]

\[ INT_{\text{rex}} = \sum_{i=1}^{3} \theta_i, INT, \sum_{i=1}^{3} \theta_i = 1. \]

\[ IP_{\text{PF}} = [(INT_{\text{rex}} + PRE) FDDEBT_{(t-1)}] + (INT_{\text{FOD}} + SPRD_{\text{FIR}}) FFDEBT_{(t-1)} \]

\[ TSSC_F = (1 - \theta). TSSC \]

\[ FTOTEXP = INC_{\text{PROPF}} + IP_{\text{PF}} + TSSC_F + DTAX_F + OTHFEX \]

\[ FDDEBT = FDDEBT_{(t-1)} + DCD_F \]

\[ FFDEBT = [(FODRD_{(t-1)} - GFDEBT_{(t-1)}) + DCF_F] \]

\[ FTDEBT = FDDEBT + FFDEBT \]

\[ FFSTOD = FFDEBT - DCF_F \]

\[ FDSTOD = FDDEBT - DCD_F \]

\[ FTSTOD = FFSTOD + FDSTOD \]

The country's total foreign debt comes from the Balance-of-Payments block: it is essentially the previous year's stock plus the current year's borrowing requirement that results from the current account balance and the movements of short and long-term capital. The firms' domestic debt results from the previous year's stock plus the current year's borrowing requirement in the domestic market that results from the firms' savings/investment gap.

The interest rate applying to firms' foreign debt may be subject to a spread over the exogenously determined foreign interest rate (INT\text{FOD}) in international capital markets. Similarly, the interest rate applying to firms' domestic debt may be subject to a risk-premium over the endogenously determined money market interest rate in the domestic capital market. Once both the stocks of debt and prevailing interest rates are determined, the interest payments on both domestic and foreign debt are easily computed.

Firms total expenditures (FTOTEXP) are hence the sum of interest payments, direct corporate taxes paid to the Government (econometrically determined), and other minor items of miscellaneous current expenditures.
Firms savings are finally determined as a residual of the account as well as the sector's profitability indexes.

\[
PROF_f = \left( \frac{SAV_f}{INC_f} \right)
\]

\[
II = PROF_f - INT_c
\]

\[
SAV_f = INC_f - FTOTEXP
\]

**Government Account.**

Special care has been taken regarding the Government Account because of the implications of fiscal deficits for the rest of the economy. In essence, the account is similar to that of the firms. Revenues, of course, result essentially from direct tax collection (from households \( DTAX_H \) and firms \( DTAX_F \)) and indirect taxes \( IDTAX_G \) paid by the economy. One should note the relatively high (about 1.2) elasticity of direct household income taxes. This captures the on-going fiscal drag in South Africa.

**Method=2SLS:Autocorrelation Correction=First Order**

\[
DTAX_H = \exp(-4.396).INC_c^{0.79}
\]

\[
DW = 1.49; R^2 = 0.98
\]

**Method=2SLS:Autocorrelation Correction=First Order**

\[
DTAX_F = 0.389.OPSF(I)
\]

\[
DW = 1.65; R^2 = 0.94
\]

The Government has a number of policy instruments on both the revenue and expenditure sides of its accounts. On the revenue side, although rates of direct taxation are econometrically estimated, rates of indirect taxes (taxes on international transactions and VAT --previously GST--) are...
South Africa - Economic Performance and Policies

exogenous. Hence, the SAMM computes both taxes on goods and services (TGOS or essentially the VAT) and taxes on international transaction (TIT) as follows:

\[ \tau_{VAT} = \tau_{VAT} \]
\[ \tau_{IM} = \tau_{IM} \]
\[ TGOS = \tau_{VAT} \cdot GDP_c \]
\[ TIT = \tau_{IM} \cdot (P_{IM} \cdot IM_{GNFS}) \]
\[ TOTH_{(t)} = (1 + \hat{CPI} + \lambda_{TOTH}) \cdot TOTH_{(t-1)} \]
\[ TGRANTS_{(t)} = (1 + \hat{CPI}) \cdot TGRANTS_{(t-1)} \]
\[ SUB_{(t)} = (1 + \hat{CPI} \pm \lambda_{CPI}) \cdot SUB_{(t-1)} \]
\[ TRANS_{(t)} = (1 + \hat{CPI} \pm \lambda_{TRANS}) \cdot TRANS_{(t-1)} \]

On the expenditure side, the SAMM allows the Government to use four policy variables that are semi-exogenous (semi, because they are by default indexed to the CPI). Transfers to households, to the rest of the world, subsidies to firms and grants received from abroad can grow or fall in real terms (that is in regard to domestic inflation).

Total Government Revenue (TREV) is thus the sum of tax revenue (TTAX) and non-tax revenue (TNTAX) which includes other Government income (INCPROG) and provision for depreciation.

\[ DTAX = DTAX_H + DTAX_F \]
\[ TTAX = DTAX + IDTAX_G + TSSC \]
\[ INCPROG = \bar{INCPROG} \]
\[ PROVD_G = DEP_G \cdot IGc \]
\[ TNTAX = TOTH + PROVD_G + INCPROG \]
\[ TSSC = TSSC_H + TSSC_F \]
\[ TREV = TTAX + TNTAX \]

Government total expenditures (G_TOTEXP) are composed essentially by (C_GC) recurrent expenditures (including the wage bill (GWB) and expenditures on goods and services (GS), interest payments (IP) on Government's debt and Government's capital expenditures (I_GC and OTHIGC).
which include both fixed capital formation and acquisition of other assets by the Government. Other Government expenditures (OTCG) are calculated from exogenous subsidies to firms and transfers to households.

\[
G_{\text{总}} = C_{\text{GC}} + OTCG_{\text{C}} + IP + I_{\text{GC}} + OTHI_{\text{GC}}
\]

\[
C_{\text{GC}} = GS + GWB + COSTUP
\]

\[
GS = GSK, P_g
\]

\[
OTCG_{\text{C}} = SUB + TRANS
\]

\[
IP = IP_c
\]

\[
I_{\text{GC}} = [I_{\text{GC}}(1 + \varepsilon) + DEMSHO_{IG}], P_{\text{INV}}
\]

\[
OTHI_{\text{GC}} = OTHI_{\text{GC}}
\]

We paid special attention to the expenditure items as many of the sectoral policy recommendations would have to stay within the limits defined in the macro simulations. For the baseline scenario of the paper, we took the following approach:

We assumed that Government wage rates (for both skilled and unskilled labor) would follow those in the rest of the economy. The relevant policy variable is therefore the number of Government employees in each skill category. Our simulations assumed that there would still be some positive growth of employees although with lower rates than in recent years. The Government's wage bill (GWB) is thus:

\[
GWB = (12, \Phi, WMA_{WH}), LGSK + (12, \Phi, WMA_{UNS}), (LG - LGSK)
\]

We assumed that the Government's expenditures on goods and services would depend on two factors: the number of employees, and expenditures on maintenance of the Government's capital stock. An estimated cost function was therefore:

Method=2SLS; Autocorrelation Correction=First Order

\[
GSK = \exp(-7.924), LGSK^{2.194}, LGUNS^{-0.693}, K_G^{0.770} + DEMSHO_{CG}
\]

\[
DW = 1.69; R^2 = 0.95
\]
There is a high elasticity of GSK to skilled labor (2.194) while the elasticity to unskilled labor is negative (-0.693). This is purely a statistical finding and should not be interpreted as an analytical conclusion from which policies can be derived: the negative coefficient captures the inclusion of the TBVC and SGT State employees (all black workers) in the numbers of civil servants after the 1970s. For policy purposes the point is that the combined elasticity for both labor categories is still positive and above 1.

The two demand shock (DEMSHO) variables (Government investment (DEMSHOIG) and consumption (DEMSHOCG)) are merely exogenous shocks that can be used as policy variables in the Government's account over and above the predicted levels of the respective aggregate (Government investment and consumption).

Finally, interest payments by the Government follow the same principle as for firms. The dynamic of Government debt (both domestic and foreign), however, needs to be related to the way the fiscal deficit is financed. In that respect, the Government's account closes with three measures of the deficit/surplus: the non-interest Government (primary) fiscal balance (FPD); the Government (current) fiscal balance (FCD); and finally, the Government fiscal balance (FD).

\[
FPD = TREV - C_G - OTC_Gc
\]
\[
FCD = SAV_G = TREV - C_G - OTC_Gc - IP
\]
\[
FD = TREV - G_{TOTEXP}
\]

**Fiscal Deficit Financing.**

The Government fiscal account can generate deficits that need to be financed: the SAMM allows three forms of fiscal deficit financing.

The SAMM assumes that Government's financing through domestic bank credit (FD_{EXE}) is possible but limited: only a fraction of the Government's borrowing requirements can be met through
this channel. Debt financing is the major (and usual) source of Government's deficit financing: here again, the SAMM assumes that foreign debt financing (FD_{FD}) would still be limited to about 10% of the Government's borrowing requirements in any given year and that the remaining 90% (FD_{DD}) would have to be financed in the domestic market.

\[
\xi_1 = _{\%} \\
FD_{EXE} = \text{Min}[0, (-FD - \xi_1 \cdot GDP_c)]
\]

\[
\xi_2 = 10\% \\
FD_{FD} = \xi_2 \cdot FD \\
GFDEBT = [(1 + \hat{e}).GFDEBT_{(t-1)} - FD_{FD}]
\]

\[
FD_{DD} = (1 - \xi_2) \cdot FD - FD_{EXE} \\
GDDEBT = GDDEBT_{(t-1)} - FD_{DD}
\]
9. A Simplified Monetary Sector and the Exchange Rate Rule

The macro framework should indicate how South Africa's relatively sophisticated financial sector would react to additional demand for different macro situations. The monetary sector is rudimentary at present with only one true financial instrument. Nevertheless, it captures two standard effects linked to expansionary public policies: the effect of increased demand pressure on domestic interest rates; and the crowding-out of the private sector from the domestic markets because of the excessive public sector's borrowing requirements.

**Demand for Credit in the Economy.**

Demand for credit in the economy is derived from the relevant National Accounts identities. If total savings equal the current account balance, demand for credit from the corporate sector can be calculated as a residual once both Government's and households' savings/investment identities are computed.

\[
\begin{align*}
SAV_{TOT} & = CAB = SAV_F + SAV_H + FCD \\
DC_H & = -SAV_H + I_{ Fin, P_{ INV}} \\
DC_F & = -CAB - FD + PINV \cdot (I_{ Fin} + I_{ PrNoH} + I_{ Pr}) - SAV_H - SAV_F \\
DC_G & = FD_{ EXE} \\
DC_{TOT} & = DC_H + DC_F + DC_G
\end{align*}
\]

The borrowing behavior of the corporate sector deserves some explanation. Demand for credit in the domestic market by the corporate sector depends on: first, corporate financing equal the residual from the growth in the money supply minus Government borrowing; second, corporations will borrow 90% of needs in the domestic market, and 10% overseas (as a precautionary diversification measure) whenever the growth in the money supply is sufficient to accommodate their demand for credit and the domestic interest rate (plus its relevant risk premium) is below the foreign
interest rate (plus its relevant spread). Otherwise, corporations will borrow only marginally (10%) in the domestic market and seek financing (90%) in foreign markets.

\[ DCD_F = \]

\[ (DC_F),_{Total\ Accmodation} \leftrightarrow \]

\[ [(\Delta M2 - DC_G - DC_F) \geq 0] & [(INT_{FOD} + SPRD_{FIR}) \geq (INT + PRE)] \]

or

\[ (\Delta M2 - DC_G),_{Residual\ Crowded-Out} \leftrightarrow \]

\[ [(\Delta M2 - DC_G - DC_F) < 0] & [(INT_{FOD} + SPRD_{FIR}) < (INT + PRE)] \]

or

\[ (\Delta M2 - DC_G),_{Residual\ Crowded-Out} \leftrightarrow \]

\[ [(\Delta M2 - DC_G - DC_F) < 0] & [(INT_{FOD} + SPRD_{FIR}) < (INT + PRE)] \]

The supply side of the monetary sector is simplified to an accommodation rule by the Reserve Bank: expansion in M2 follows expected inflation (derived from the previous year's change in the CPI) and expected GDP growth (derived from the previous year GDP's growth). (RB_{FAC}) allows the monetary authorities to be more or less restrictive in their policy stance.

\[ \hat{M}2 = \alpha . C\hat{P}I_{(t-1)} + \beta . G\hat{D}P_{(t-1)} + RB_{FAC} \]

**Interest Rates.**

Excess demand for credit also affects the level of domestic interest rates. The SAMM estimates a rough equation where the money market interest rate depends on the central bank's discount rate (which is set not to allow a real discount rate below 1%), and an indicator of
disequilibrium in the demand/supply of credit for the economy. Several equations were tried and the present version of the money market interest rate equation [45] in the SAMM is:

**Method=2SLS; Autocorrelation correction=None**

\[
INT = \left( \frac{DC_{TOT}}{GDPc} \right)^{0.162}_{(1.54)} \cdot INT_{DR}^{0.589}_{(3.56)} \cdot \exp(-0.323)^{(-2.58)}
\]

\[DW = 1.86; R^2 = 0.90\]

The second interest rate is the T-Bill rate. This is used as the reference rate for interest payments on Government paper. The T-Bill rate is assumed to depend on the money market rate, the discount rate and the country's risk factor (through a reaction function of the central bank), that is, on the inflation differential between South Africa and the industrialized countries. The fitted equation [46] is:

**Method=2SLS; Autocorrelation correction=First Order**

\[
INT_{TB} = -0.053 + 0.495 \cdot INT_{(t-1)}^{(-3.10)} + 0.493 \cdot INT_{DR}^{(4.02)} + 0.003 \cdot CPI^{(1.66)} \cdot CPIc_{(t-1)}^{(-2.66)}
\]

\[DW = 1.71; R^2 = 0.90\]

**Exchange Rate rule.**

The rule is to maintain a constant real exchange rate, thus adjusting the nominal rate according to the inflation differential between South Africa and its major trading partners (assumed here to be the major industrialized developed countries). The adjustment is based on the previous year's inflation rates and may therefore allow temporary changes in the real exchange rate in any given year.

\[E_{(t)} = E_{(t-1)} \cdot \left( 1 + C\tilde{P}_{(t-1)} - C\tilde{P}_{IC\{t-1\}} \right)\]
10. Balance of Payments

The Balance of Payments closes the SAMM regarding the external sector.

Current Account.

The Current Account balance comes from both the trade balance and the factor services payments. The trade balance (of goods and non-factor services NFS) derives from our previous export and import equations.

\[ TRDBAL = X_{GNFS} - IM_{GNFS} \]
\[ TRDBLC = P_{EX} \cdot X_{GNFS} - P_{IM} \cdot IM_{GNFS} \]
\[ \zeta = 0.5\% \]
\[ \sigma = 1.5\% \]
\[ IP_{FODRD} = (INT_{FOD} \cdot FOD_{NFAF}) + FODR_{DAF} - [(INT_{FOD} - \zeta) \cdot RES_{AC}] + STFODR \cdot (INT_{FOD} + \sigma) \]
\[ NFS = ONFS + IP_{FODRD} \]
\[ CAB = TRDBLC - NFS \]
\[ ONFS = \Theta_{ONFS} + \phi \cdot GDP_c \]

Non-Factor Services (NFS) are composed by Other Non-Factor Services (ONFS) and payments on foreign debt (IP_{FODRD}) of all agents in the economy. The payment of Other Non-Factor Services (ONFS) depends on the GDP_c. To avoid a double-counting, the current account balance works from the trade balance of goods and non-factor services NFS and net factor services payments.

Payments on foreign debt, in turn, are composed of the payments resulting from the 1993 debt agreement (affected debt), plus the interest payments on the remaining non-affected debt, minus interest paid on foreign reserves plus interest paid on short-term debt.
The closure of the BOP is given by the identity between changes in net foreign assets (NFA) and the current account balance plus changes in reserves:

$$\Delta NFA = -(CAB) + \Delta RESER$$

Following the usual tradition, a target level for foreign reserves is defined as an agreed proportion of imports. Reserves will, of course, accumulate only if the current account balance is large enough.

$$\omega_1 = (6/12)$$
$$\omega_2 = (1/12)$$
$$\Delta RES_{STAR} =$$

$$0 \iff (RES_{AC(t-1)} \geq \omega_1 . P_{IM} . IM_{GNFS})$$

or

$$\omega_2 . P_{IM} . IM_{GNFS} \iff (RES_{AC(t-1)} < \omega_1 . P_{IM} . IM_{GNFS})$$

$$\theta = (1/12)$$
$$\Delta RESER =$$

$$0 \iff (CAB < \theta . P_{IM} . IM_{GNFS})$$

or

$$\Delta RES_{STAR} \iff (CAB \geq \theta . P_{IM} . IM_{GNFS})$$

Long-term capital flows are modeled essentially as a mirror of the trade account balance and a function of prevailing interest rates.

$$LTKM = C + \alpha . TRDBLc + \beta . INT + \chi . DUMMY86$$
PART III

DETAILED RESULTS OF SCENARIOS SIMULATED WITH THE SAMM

We provide here more detailed Tables of both Results and Assumptions regarding the scenario simulations discussed in Volume II. We start with scenarios A, B and C; then scenarios C, D and E; finally we provide graphic illustrations for some macro aggregates of the differences between scenarios A, B and C. The year-by-year and complete set of results is available upon request.
DETAILED RESULTS OF SCENARIOS SIMULATED WITH THE SAMM

1. Scenarios A, B and C
Table A.6a: South Africa - Detailed Results of Simulations (Scenarios A, B and C)  
(Source: World Bank Staff projections)

<table>
<thead>
<tr>
<th>SOUTH AFRICA RESULTS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT</th>
<th>SCENARIO A: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO B: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO C: SUPPLY ENHANCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/20/94 18:48</td>
<td>ACTUAL  HISTORIC</td>
<td>HISTORICAL INVESTMENT RESPONSE</td>
<td>REVIVAL OF INVESTOR CONFIDENCE</td>
</tr>
<tr>
<td><strong>Real Growth Rates (Volumes / 1985 prices)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product</td>
<td>5.7 3.6 2.3 1.3 -2.1</td>
<td>1.9 2.7 0.7 -0.1</td>
<td>1.9 3.6 1.9 2.4</td>
</tr>
<tr>
<td>Non-Government GDP</td>
<td>5.7 3.4 2.1 0.9 -2.8</td>
<td>2.5 2.7 0.7 -0.6</td>
<td>2.5 3.4 1.5 2.1</td>
</tr>
<tr>
<td>Private Consumption</td>
<td>5.4 4.1 3.7 2.4 -2.3</td>
<td>1.8 1.9 0.7 -1.0</td>
<td>1.8 2.5 1.6 1.9</td>
</tr>
<tr>
<td>Government Consumption</td>
<td>9.0 8.3 8.6 4.2 -3.7</td>
<td>1.5 3.0 2.7 2.2</td>
<td>1.5 4.2 4.0 4.4</td>
</tr>
<tr>
<td>Imports of CNIIFS</td>
<td>7.8 3.1 0.9 3.2 -4.4</td>
<td>-6.6 4.8 -0.9 -2.4</td>
<td>-6.6 3.0 6.2 0.1</td>
</tr>
<tr>
<td>Exports of CNIIFS</td>
<td>4.5 3.1 0.8 1.8 1.0</td>
<td>1.5 1.3 0.4 1.0</td>
<td>1.5 2.9 2.4 2.7</td>
</tr>
<tr>
<td>Investment (Gross Domestic Fixed)</td>
<td>8.6 5.8 2.0 -2.8 -9.9</td>
<td>-4.7 8.1 -3.7 -4.5</td>
<td>-4.7 8.5 5.9 -0.9</td>
</tr>
<tr>
<td>o/w Private Non-Housing</td>
<td>8.5 6.0 3.9 1.3 -5.4</td>
<td>-9.3 10.9 -3.9 -6.9</td>
<td>-9.3 10.8 9.1 -0.9</td>
</tr>
<tr>
<td><strong>Percent change per year (1985 prices)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP deflator</td>
<td>13.3 12.7 15.5 14.4 12.1</td>
<td>7.7 15.3 16.1 14.6</td>
<td>7.7 9.9 19.8 20.1</td>
</tr>
<tr>
<td>Private Consumption Prices</td>
<td>12.3 10.1 14.0 15.3 16.2</td>
<td>6.3 14.4 16.7 14.7</td>
<td>6.3 8.3 19.2 20.5</td>
</tr>
<tr>
<td>Producer Prices</td>
<td>3.7 9.2 15.7 16.6 15.5</td>
<td>10.8 14.1 17.8 15.2</td>
<td>10.8 7.5 19.4 20.2</td>
</tr>
<tr>
<td>Export Prices</td>
<td>16.0 20.4 157.9 9.2 4.1</td>
<td>15.8 14.6 16.3 15.6</td>
<td>15.8 9.8 18.4 21.6</td>
</tr>
<tr>
<td>Import Prices</td>
<td>2.0 15.9 16.5 9.7 5.5</td>
<td>14.4 13.4 16.7 15.2</td>
<td>14.4 10.0 16.2 20.2</td>
</tr>
<tr>
<td>Terms of Trade</td>
<td>-0.9 3.0 -0.7 -0.5 -1.3</td>
<td>1.2 1.2 -0.3 -2.9</td>
<td>1.2 0.0 1.9 -1.3</td>
</tr>
<tr>
<td>Terms of Trade (non-gold)</td>
<td>-0.5 -2.5 -2.2 -0.7 0.3</td>
<td>-0.5 -2.7 -0.5 -2.2</td>
<td>-0.5 -2.3 2.6 -1.5</td>
</tr>
<tr>
<td><strong>Interest Rates (in percent)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discount Rate (RBSA)</td>
<td>4.7 6.5 14.5 14.4 14.0</td>
<td>12.5 13.4 16.7 19.1</td>
<td>12.5 10.2 16.3 23.1</td>
</tr>
<tr>
<td>Money Market</td>
<td>7.1 10.1 17.2 17.2 18.9</td>
<td>15.0 17.0 20.1 21.3</td>
<td>15.0 14.0 18.9 23.5</td>
</tr>
<tr>
<td>Treasury Bills</td>
<td>2.2 4.7 12.6 14.0 15.7</td>
<td>10.5 15.5 18.3 18.8</td>
<td>10.5 14.0 15.7 23.2</td>
</tr>
<tr>
<td><strong>Per Capita Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP in current USD</td>
<td>5.67 1.400 2.410 2.444 2.932</td>
<td>2.896 3.520 3.852 3.708</td>
<td>2.896 3.517 4.325 5.083</td>
</tr>
<tr>
<td>Private Cons. in current USD</td>
<td>3.43 7.81 1.204 1.403 1.838</td>
<td>1.848 2.107 2.331 2.307</td>
<td>1.848 2.060 2.488 2.778</td>
</tr>
<tr>
<td>Real Disposable Income in R5 ZAR</td>
<td>1.699 2.106 2.162 2.072 3.972</td>
<td>1.948 2.094 1.927 1.587</td>
<td>1.948 2.090 1.906 1.963</td>
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</table>
Table A.6b: South Africa - Detailed Results of Simulations (Scenarios A, B and C)  
(Sources: World Bank Staff projections)

<table>
<thead>
<tr>
<th>SCENARIO A:</th>
<th>SCENARIO B:</th>
<th>SCENARIO C:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTUAL</td>
<td>HISTORIC</td>
<td>NO SUPPLY ENHANCEMENT</td>
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<table>
<thead>
<tr>
<th>SOUTH AFRICA RESULTS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT</th>
<th>6/20/94</th>
<th>16/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of GDP at 1985 market prices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product ZAR billion</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>Private Consumption</td>
<td>21.6</td>
<td></td>
</tr>
<tr>
<td>Government Consumption</td>
<td>18.6</td>
<td></td>
</tr>
<tr>
<td>Imports of CNPS</td>
<td>32.7</td>
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<tr>
<td>Exports of CNPS</td>
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<tr>
<td>Domestic Fixed Investment</td>
<td>35.5</td>
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<tr>
<td>Government Fixed Investment</td>
<td>19.7</td>
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</tr>
<tr>
<td>Private No-Housing</td>
<td>8.6</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>3.4</td>
<td></td>
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<tr>
<td>Private Non-Housing</td>
<td>5.3</td>
<td></td>
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<tr>
<td>Percentage of GDP at current market prices</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product USD billion</td>
<td>21.6</td>
<td></td>
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<tr>
<td>Government Account</td>
<td>18.6</td>
<td></td>
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<tr>
<td>Total Government Revenue</td>
<td>21.6</td>
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<tr>
<td>Tax Revenues</td>
<td>16.7</td>
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<td>Total Government Expenditures</td>
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<tr>
<td>Salaries</td>
<td>7.7</td>
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<tr>
<td>Goods &amp; Services</td>
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<td>Interest on Government Debt</td>
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<tr>
<td>Cost of Upgrading Skills</td>
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<tr>
<td>Total Current Expenditures</td>
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<tr>
<td>Fiscal Primary Current Deficit</td>
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<td>Fiscal Current Deficit</td>
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<tr>
<td>Fiscal Deficit</td>
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<td></td>
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<td>Government Domestic Debt</td>
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<td>Government Foreign Debt</td>
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<td>External Sector</td>
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<td>Trade Balance</td>
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<tr>
<td>Current Account Balance</td>
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<tr>
<td>Current &amp; Capital Account Balance</td>
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<td>Total Stock of Foreign Debt</td>
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<td>Interest Payments on Foreign Debt</td>
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</tbody>
</table>

Annex A - Macroeconometric Model (SAMM) Part III  
page 225
South Africa - Economic Performance and Policies

Table A.6c: South Africa - Detailed Results of Simulations (Scenarios A. B and C)
(Sources: WorldBankStaffprojections)
SCENARIOA:
SOUTHI AFRICA

SCENARIO B

NO SUPPLY ENHIANCEMENT

RESULTS OF

ACTUAL

HISTORIC

SCENARIO C:

NO SUPPLY ENHANCEMENT

IIISTORICAL INVESThIENTRESPONSE

REVIVAL OF INVESTOR

SUPPLY ENHANCEMENT

CONFLDENCE

OF LNVESTOR CONFIDENCE

REVIVAL

DEMfAND SHOCK EXPERLMENTS
ON GOV LNVt-7SMENT
AND THE SUPPLY CONSTRAL'T
4nflo94
18:48

Wages in Manufaduring

1960-70

1970-80

1980-85

1986-1991

1992

1993

1994-1997

19982001

2002-2005

1993

1994-1997

1998-2001

2002-OOS

1993

1994-1997

1998-2001

2002-200S

sector (in current ZAR/month)

Skilled Labor(A)
UknskDed Labor (B)
Ratio (B)/(A)
Real Wage SkiDed Labor (C)
Real Wage UnskiDed Labor (0)
Real Unsk. Lab. Wage w/ S. Upgrd.
Real Growti Wage Skilled L (.)
Real Crowth WagelUnskilled L()

215

545

1,400

3,004

4.547

5,249

7,436

14,311

25,631

5,249

7,092

12,714

28731

5,249

7,020

10,909

23,744

43

122

358

882

1,420

1,567

2,112

3,832

6,715

1,567

1,962

3,354

7,827

1,567

1,953

2,831

6,150

0.20
1J343

0222
1,689

0.26
1,862

0.29
1,766

0.31
1,665

030
1,694

0.28
1,731

0.27
1,816

0.26
1,721

0.30
1,694

0.28
1,785

0.26
1,909

0.27
1,977

0.30
1,694

0.28
1,793

026
1,989

0.26
2,216

269

366

473

514

520

506

493

487

451

506

495

503

538

506

499

516

574

n a.

MA.
a

a

n.a.

nas

506

493

487

451

506

495

503

538

506

505

551

63

3.0
1.9

1.8
4.1

0.8
2.2

-1.3
1.2

-2.2
0.0

-1.8
-2.1

1.3
-0.7

0.3
-0.5

-2.1
-2.9

-1.8
-2.1

2.1
4.8

13
1.4

0.8

-1.8

2.6

2.

1.5

-2.1

2.4
-0.4

2.1

2.5

Rel.ative Factor Costs (percent)
ge in Unit LaborCost

3.9

11.S

16.0

147

1S3

6.2

3.1
12

-3.5
-5.7

12.6
10.0

9.1
6.9

-7.9
-11.1

-34.6
-32.3

15.3
15.0
17.0

18.3

Change in User Capital Cost
Change in Relative (Lab/Cap) Cost

11.9
1,5
45

6.2
-34.6
-32.3

10.4
46.4
49.2

23.9
-3.8
-4.6

19.9
8.8
6.9

62
-34.6
-32.3

7.8
-11.6
-9.2

17.6
34.1
35.1

19.4
6.
2.

1,582
5,259

1,839
6,053

1,J41
5,961

1,975
7,366
1,430

2.088

2,217
7,962
1,680

1,927
6,300
1,360

2,003

1,927

2,034

2,299

2,65

7,097
1,430

2.088
8,636
1,549

2,217

8,103
1,549

10,144
1,680

6,300
1,360

7,248
1,430

8,629

2.4
2.6

Wage Employment (thousands)
Demand for Skilled libor
Demand for Unskilled labor
Total Govemmcnt employment

1,245
4,161
544

809

1,786
S,921
1,06

1,280

1,360

1.927
6,300
1,360

1,549

11,463
1,6

Total non-Coverrmrnt

4,862

6,033

6,648

6,612

6,442

6,866

7,911

8,642

8,499

6,866

7,671

9,174

10,681

6,86

7,853

9,379

12,441

5,406
nA.

6,841
na.

7,713

7,892

7,802

9,34 }

10,191

10,178

8,226

9,101

10,724

12,361

8,226

9,282

10,928

14,120

a.

na.

nA.

8,226
424

1,539

2,389

2,376

424

1,299

2,922

4,559

424

1,480

3,126

2.8
2.9

1.7
2.0

08
1.1

5.1
4.5

2.6
25

-1.3
-0.8

0.9
0.8

4.2
3.8

6.3
5.7

2.6
25

0.9
0.8

3.6
3.3

8.7
7.7

Percent of Labor Force Out of Wage Employm.nt
ikdledlabor fomc.
15.0

emptloyment

rotal wage employment

New jobsvis-a-vis 1992
Wage Employment (growth rate)
Total non-Government employmmt
Total employmnmt

.

-°51
sl
0.0

0.2
C.0

O.9
0.8

1S 0

16.7

19.6

21.4

18.6

26.8

29.8

36.6

45.1

50.7

493

24.3

268

32.9

40.7

46.5

44.4

Productivity ratios (1985 prices)
Total Capital Stock
Non-Covemrent
Capital Stock

0.48
0.70

0 41

0.35
0.49

0.33
0.47

022
0.46

0.33

0.61

Spare Capacity 1% of GDPNG)

23

2.1

3.9

46

9.3

UnskiUed labor force
ToLallabor (Skifled and Unskiled)

AnnecxA- Macroeconomtric Model (SAMM) Parl I

18.6

6,31

5.
5.3

17.4

17.4

186

17.4

17.4

17.4

18.6

17.2

16.0

14.9

45.0

51.3

493

465

41.5

38.1

49.3

45.2

40.7

28.2

405

41.0

46.6

42.0

38.0

35.2

44.4

40.8

36.8

260

0.34
0.50

0.34
0.50

0.33
0.48

0.33
0.48

0.35
051

0.35
0.49

0.34
0.45

0.33
0.48

0.35
052

0.37
0.54

0.38

0.48
8.0

4.3

4.7

16.3

8.0

2.7

0.0

0.0

8.0

3.

13

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.445

. 44.4

0.54

page 226


Table A.7a: South Africa - Detailed Assumptions of Simulations (Scenarios A, B and C)  
(Sources: World Bank Staff projections)

<table>
<thead>
<tr>
<th>Scenario A:</th>
<th>Scenario B:</th>
<th>Scenario C:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Enhancement</td>
<td>No Supply Enhancement</td>
<td>Supply Enhancement</td>
</tr>
<tr>
<td>Historical Investment Response</td>
<td>Revival of Investor Confidence</td>
<td>Revival of Investor Confidence</td>
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</tbody>
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<table>
<thead>
<tr>
<th>SOUTH AFRICA</th>
<th>ACTUAL</th>
<th>HISTORIC</th>
<th>NO SUPPLY ENHANCEMENT</th>
<th>NO SUPPLY ENHANCEMENT</th>
<th>SUPPLY ENHANCEMENT</th>
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</thead>
<tbody>
<tr>
<td>Economic Performance and Policies</td>
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<thead>
<tr>
<th>Social and Political Climate</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Number of strikes (1000 days lost)</td>
<td>73.36</td>
<td>181.18</td>
<td>356.17</td>
<td>898.83</td>
<td>789.00</td>
</tr>
<tr>
<td>Bonus Increase on Real Wage Unsk. (%/year)</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skills Upgrading</th>
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</thead>
<tbody>
<tr>
<td>Upgraded Unskilled Workers each year (000)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Cumul. Upgrad. Workers / Tot. Skil. Lab. F (%)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</table>

<table>
<thead>
<tr>
<th>Additional Private Investment Response</th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Investment Additional (over model)</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
</tr>
<tr>
<td>Add. Priv. Investment (% of GDP)</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Expenditure Policies</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Investment (current ZAR Million)</td>
<td>308</td>
<td>483</td>
<td>1,140</td>
<td>2,287</td>
<td>4,519</td>
</tr>
<tr>
<td>Government Investment (ZAR 1985 Million)</td>
<td>2,194</td>
<td>3,805</td>
<td>7,692</td>
<td>3,812</td>
<td>7,678</td>
</tr>
<tr>
<td>Gov. Addit. Inv. / 1992 base (ZAR 85 Million)</td>
<td>0</td>
<td>1,166</td>
<td>455</td>
<td>710</td>
<td>0</td>
</tr>
</tbody>
</table>

| Annex A - Macroeconometric Model (SAMM) Part III | page 227 |
**Table A.7b: South Africa - Detailed Assumptions of Simulations (Scenarios A, B and C)**

(Source: World Bank Staff projections)

<table>
<thead>
<tr>
<th>SOUTH AFRICA ASSUMPTIONS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT</th>
<th>ACTUAL</th>
<th>HISTORIC</th>
<th>SCENARIO A: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO B: NO SUPPLY ENHANCEMENT</th>
<th>SCENARIO C: SUPPLY ENHANCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAT Rate (former GDT) apparent</td>
<td>6.1%</td>
<td>6.8%</td>
<td>8.3%</td>
<td>10.9%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Import Tariff (apparent)</td>
<td>4.9%</td>
<td>5.6%</td>
<td>4.0%</td>
<td>5.9%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Firms direct tax apparent rate</td>
<td>16.6%</td>
<td>17.4%</td>
<td>14.7%</td>
<td>15.0%</td>
<td>11.9%</td>
</tr>
<tr>
<td>Households direct tax apparent rate</td>
<td>4.9%</td>
<td>6.2%</td>
<td>6.3%</td>
<td>5.3%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Households direct tax (of GDP)</td>
<td>4.5%</td>
<td>5.4%</td>
<td>5.9%</td>
<td>8.3%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Direct Taxes Total (% of GDP)</td>
<td>9.4%</td>
<td>11.6%</td>
<td>12.2%</td>
<td>13.5%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Transfers to Households (% of Household income)</td>
<td>3.5%</td>
<td>3.6%</td>
<td>3.8%</td>
<td>4.3%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Transfers to Households (% of GDP)</td>
<td>2.4%</td>
<td>2.5%</td>
<td>2.4%</td>
<td>2.9%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Subsidies to Firms (% of Firms Income)</td>
<td>0.9%</td>
<td>1.2%</td>
<td>1.6%</td>
<td>2.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Net Offic. Transfers from Rest of W. (% of GDP)</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.2%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

**External Sector**

- **Gold Discoveries (Grain/day)**: 12.62, 10.11, 6.67, 5.21, 5.37, 5.40, 5.44, 5.57, 5.69, 5.40, 5.56, 5.57, 5.69
- **Nominal Gold Price (USD/ounce)**: 35.97, 175.71, 423.90, 396.39, 343.72, 360.00, 389.13, 399.14, 399.14, 360.00, 389.13, 399.14, 399.14
- **OECD Industrial Prod. Index (real growth)**: 5.9%, 3.1%, 1.7%, 2.5%, -0.7%, 3.3%, 3.3%, 3.3%, 3.3%, 3.3%, 3.3%, 3.3%, 3.3%
- **OECD Inflation (change/year)**: 3.0%, 8.6%, 9.0%, 3.8%, 3.0%, 3.5%, 3.5%, 3.5%, 3.5%, 3.5%, 3.5%, 3.5%, 3.5%
- **Imports of Oil (real growth)**: 29.4%, 56.2%, -6.1%, -5.5%, 3.0%, 2.9%, 4.3%, 4.4%, 3.5%, 2.9%, 5.0%, 5.4%, 5.9%, 2.9%, 5.2%
- **Short-Term Capital Movements (% of GDP)**: 1.5%, 0.5%, 0.4%, -1.9%, -1.4%, 0.2%, 1.1%, 4.4%, 11.9%, 0.2%, 3.0%, 4.5%, 9.5%, 0.2%, 0.1%, 0.1%, 0.4%, 4.8%
- **Other Net Factor Payment (% of GDP)**: N/A, N/A, 1.5%, 2.3%, 1.8%, 2.2%, 2.2%, 3.9%, 5.6%, 2.2%, 2.2%, 3.9%, 5.6%, 2.2%, 2.2%, 3.9%
- **Interest Rate on Foreign Debt (percent)**: N/A, N/A, 9.4%, 7.3%, 5.6%, 10.0%, 10.8%, 11.6%, 11.6%, 10.0%, 10.8%, 11.6%, 11.6%, 10.0%
- **Interest Rate Differential (Dom.-Foreign)**: N/A, N/A, 7.8%, 10.1%, 13.3%, 5.0%, 6.1%, 8.5%, 11.6%, 5.0%, 3.1%, 7.3%, 11.9%, 5.0%
- **Inflation Differential (Dom.-Foreign)**: 0.3%, 1.7%, 5.0%, 11.6%, 13.2%, 2.8%, 10.9%, 13.2%, 11.6%, 2.8%, 4.8%, 15.7%, 17.0%, 2.8%
- **Change in Nominal Exchange Rate (%/year)**: 0.0%, 1.1%, 18.8%, 4.2%, 3.4%, 20.5%, 8.9%, 12.2%, 16.6%, 20.5%, 7.7%, 11.8%, 18.6%, 20.5%
- **Total Factor Productivity Growth**: N/A, 1.4%, 1.2%, 0.4%, 0.0%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%, 0.4%
DETAILED RESULTS OF SCENARIOS SIMULATED WITH THE SAMM

2. Scenarios C, D and E
Table A.8a: South Africa - Detailed Results of Simulations (Scenarios C, D and E) (Sources: World Bank Staff projections)

| SOUTH AFRICA RESULTS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT 4/20/94 19:31 |
|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| SOUTH AFRICA | ACTUAL | HISTORIC | SUPPLY ENHANCEMENT REVIVAL OF INVESTOR CONFIDENCE | SUP. ENH. + REV. PRIV. CONT. LABOR-INTENSIVE TECHNOLOGY | SUP. ENH. + REV. PRIV. CONT. LAB. INT. TEC. & FAVOR. EXT. ENVIR. |
| Real Growth Rates (Volumes / 1985 prices) | | | | | | | | | | | | |
| Gross Domestic Product | 5.7 | 3.6 | 2.3 | 1.3 | -2.1 | 1.9 | 4.2 | 4.4 | 5.9 | 1.9 | 2.7 | 5.6 | 5.0 | 1.9 | 4.6 | 6.7 | 8.3 |
| Non-Government GDP | 5.7 | 3.4 | 2.1 | 0.9 | -2.8 | 2.5 | 4.3 | 4.7 | 5.3 | 2.5 | 3.8 | 5.4 | 5.0 | 1.8 | 2.5 | 4.2 | 6.8 |
| Private Consumption | 5.4 | 4.1 | 3.7 | 2.4 | -3.3 | 1.8 | 2.9 | 3.5 | 5.6 | 1.8 | 2.3 | 4.0 | 5.4 | 1.8 | 2.5 | 4.2 | 6.8 |
| Government Consumption | 9.0 | 8.3 | 8.6 | 4.2 | -3.7 | 1.5 | 4.4 | 6.2 | 6.7 | 1.5 | 4.2 | 5.5 | 7.4 | 1.5 | 4.4 | 6.2 | 6.7 |
| Imports of GNFs | 7.8 | 3.1 | 0.9 | 3.2 | -2.8 | 6.6 | 5.1 | 7.0 | 6.3 | 6.6 | 3.8 | 6.5 | 3.9 | 6.6 | 5.5 | 10.4 | 11.3 |
| Exports of GNFs | 4.5 | 1.1 | 0.8 | 1.0 | 1.0 | 1.5 | 3.7 | 5.6 | 4.8 | 1.5 | 4.0 | 4.8 | 6.3 | 1.5 | 7.6 | 11.7 | 13.9 |
| Investment (Gross Domestic) | 8.6 | 5.8 | 2.0 | 2.8 | -9.9 | -4.7 | 8.8 | 10.6 | 6.4 | -4.7 | 9.3 | 11.7 | 1.6 | -4.7 | 9.7 | 12.0 | 11.0 | 6.3 |
| o/w Private Non-Housing | 8.5 | 6.0 | 3.9 | 1.3 | -5.4 | -6.3 | 8.3 | 11.7 | 8.3 | -9.3 | 12.6 | 11.3 | 8.3 | -9.3 | 12.6 | 13.3 | 8.1 |
| Percent change per year (1985 prices) | | | | | | | | | | | | |
| GDP deflator | 13.3 | 12.9 | 15.5 | 14.4 | 12.3 | 7.7 | 9.2 | 15.6 | 17.1 | 7.7 | 10.5 | 16.7 | 20.2 | 7.7 | 10.5 | 17.7 | 19.4 |
| Consumer Price Index | 12.0 | 10.3 | 14.0 | 15.3 | 16.2 | 6.3 | 6.9 | 12.8 | 19.2 | 6.3 | 9.9 | 17.3 | 18.9 | 6.3 | 9.7 | 16.9 | 19.1 |
| Producer Prices | 3.7 | 9.2 | 15.7 | 16.6 | 15.5 | 10.8 | 6.2 | 12.7 | 19.1 | 10.8 | 9.4 | 17.1 | 18.8 | 10.8 | 9.0 | 16.6 | 18.8 |
| Export Prices | 16.0 | 20.4 | 15.7 | 9.2 | 4.1 | 15.8 | 9.1 | 12.3 | 20.2 | 15.8 | 11.1 | 17.6 | 19.6 | 15.8 | 11.1 | 18.6 | 21.0 |
| Import Prices | 2.0 | 15.9 | 16.5 | 9.7 | 3.5 | 14.4 | 10.0 | 9.5 | 19.1 | 14.4 | 10.7 | 16.5 | 18.8 | 14.4 | 10.0 | 16.6 | 18.8 |
| Terms of Trade | -9.9 | 3.9 | -0.7 | -0.5 | -1.5 | 1.2 | -0.8 | 2.5 | -0.4 | 1.2 | 0.4 | 1.0 | 0.1 | 1.2 | 1.1 | 1.7 | 0.5 |
| Terms of Trade (non-gold) | -0.5 | -2.1 | -2.7 | 0.7 | 0.1 | -1.8 | -1.2 | 2.8 | -0.9 | -1.8 | 0.3 | 1.0 | -0.2 | -1.8 | 0.5 | -0.8 |
| Interest Rates (in percent) | | | | | | | | | | | | |
| Discount Rate (RB3A) | 4.7 | 6.5 | 14.5 | 14.4 | 14.0 | 12.5 | 10.2 | 9.9 | 20.4 | 12.5 | 10.8 | 16.6 | 19.5 | 12.5 | 10.0 | 16.4 | 20.1 |
| Money Market | 7.1 | 10.2 | 17.2 | 17.2 | 18.9 | 15.0 | 13.9 | 13.9 | 20.7 | 15.0 | 15.1 | 18.0 | 19.5 | 15.0 | 14.2 | 15.3 | 26.3 |
| Treasury Bills | 2.2 | 4.7 | 12.6 | 14.0 | 15.7 | 10.5 | 9.7 | 10.7 | 20.2 | 10.5 | 12.0 | 16.4 | 19.6 | 10.5 | 12.0 | 16.1 | 21.5 |
| Per Capita Indicators | | | | | | | | | | | | |
| Private Cons. in current USD | 343 | 781 | 1304 | 1403 | 1.836 | 1.848 | 2.047 | 2.499 | 3.311 | 1.848 | 2.120 | 2.620 | 3.402 | 1.848 | 2.172 | 2.874 | 3.968 |
| Real Disposable Income in 85 ZAR | 1.699 | 2.916 | 2.162 | 2.072 | 1.972 | 1.948 | 2.130 | 2.194 | 2.508 | 1.948 | 2.085 | 2.032 | 2.529 | 1.948 | 2.085 | 2.032 | 2.529 |

Annex A - Macroeconomic Model (Samm) Part III
Table A.8b: South Africa - Detailed Results of Simulations (Scenarios C, D and E)  
(Sources : World Bank Staff projections)

<table>
<thead>
<tr>
<th>SOUTHW AFRICA</th>
<th>SCENARIO C:</th>
<th>SCENARIO D: SUPPLY ENHANCE+REV.PRIV.COT.</th>
<th>SCENARIO E: SUPPLY ENHANCE+REV.PRIV.COT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESULTS OF</td>
<td>ACTUAL HISTORIC</td>
<td>SUPPLY ENHANCEMENT</td>
<td>LABOR-INTENSIVE TECHNOLOGY</td>
</tr>
<tr>
<td>DEMAND SHOCK EXPERIMENTS</td>
<td>NO GOV. INVESTMENT</td>
<td>REVIVAL OF INVESTOR CONFIDENCE</td>
<td></td>
</tr>
<tr>
<td>AND THE SUPPLY CONSTRAINT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/2094 19:31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage of GDP at 1985 market prices</th>
<th>South Africa - Economic Performance and Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product ZAR billion</td>
<td>64.1 97.6 120.6 130.0 130.1 130.4 148.1 171.6 218.4 133.4 151.4 181.2 223.2 133.4 154.4 192.2 259.7</td>
</tr>
<tr>
<td>Private Consumption</td>
<td>47.4 50.1 53.1 55.6 57.3</td>
</tr>
<tr>
<td>Government Consumption</td>
<td>18.6 21.6 17.8 18.6 19.6</td>
</tr>
<tr>
<td>Imports of GNP</td>
<td>32.7 34.3 27.3 24.8 27.3</td>
</tr>
<tr>
<td>Exports of GNP</td>
<td>47.0 37.1 30.6 31.7 34.3</td>
</tr>
<tr>
<td>o/w Gold Exports</td>
<td>31.5 18.5 12.7 10.6 10.2</td>
</tr>
<tr>
<td>Gross Dom. Fixed Investment</td>
<td>19.7 25.5 25.9 18.8 16.3</td>
</tr>
<tr>
<td>o/w Private Non-Housing</td>
<td>8.6 10.7 12.2 10.0 9.9</td>
</tr>
<tr>
<td>o/w Government</td>
<td>3.4 3.9 2.6 2.1 1.5</td>
</tr>
<tr>
<td>o/w Percentual</td>
<td>5.3 8.5 8.7 4.7 3.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage of GDP at current market prices</th>
<th>South Africa - Economic Performance and Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product ZAR billion</td>
<td>8.1 9.1 9.0 9.5 9.5</td>
</tr>
<tr>
<td>Gross Domestic Product USD billion</td>
<td>11.9 37.5 71.6 89.5 114.8</td>
</tr>
<tr>
<td>Government Account</td>
<td>21.6 24.9 25.3 26.9 27.6</td>
</tr>
<tr>
<td>Total Government Revenue</td>
<td>16.7 19.8 22.1 25.9 26.8</td>
</tr>
<tr>
<td>Tax Revenues</td>
<td>18.0 23.5 26.6 30.6 33.7</td>
</tr>
<tr>
<td>Total Government Expenditures</td>
<td>7.7</td>
</tr>
<tr>
<td>Salaries</td>
<td>3.3</td>
</tr>
<tr>
<td>Government Account</td>
<td>3.3</td>
</tr>
<tr>
<td>Cost of Upgrading Skills</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Current Expenditures</td>
<td>11.0</td>
</tr>
<tr>
<td>Gov. Dom. Fixed Investment</td>
<td>3.5</td>
</tr>
<tr>
<td>Fiscal Primary Current Deficit</td>
<td>7.3</td>
</tr>
<tr>
<td>Fiscal Current Deficit</td>
<td>6.2</td>
</tr>
<tr>
<td>Fiscal Deficit</td>
<td>1.5</td>
</tr>
<tr>
<td>Government Domestic Debt</td>
<td>43.2</td>
</tr>
<tr>
<td>Government Foreign Debt</td>
<td>2.1</td>
</tr>
<tr>
<td>External Sector</td>
<td>2.3</td>
</tr>
<tr>
<td>Trade Balance</td>
<td>-1.6</td>
</tr>
<tr>
<td>Current Account Balance</td>
<td>0.4</td>
</tr>
<tr>
<td>Current &amp; Capital Accounts Balance</td>
<td>18.4</td>
</tr>
<tr>
<td>Total Stock of Foreign Debt</td>
<td>3.0</td>
</tr>
<tr>
<td>Interest Payments on Foreign Debt</td>
<td>n.a.</td>
</tr>
</tbody>
</table>
### Table A.8c: South Africa - Detailed Results of Simulations (Scenarios C, D and E)

(Source: World Bank Staff projections)

<table>
<thead>
<tr>
<th>SOUTHERN AFRICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESULTS OF</td>
</tr>
<tr>
<td>DEMAND SHOCK</td>
</tr>
<tr>
<td>EXPERIMENTS</td>
</tr>
<tr>
<td>ON GOV. INVESTMENT</td>
</tr>
<tr>
<td>AND THE SUPPLY CONSTRAINT</td>
</tr>
<tr>
<td>Wages in Manufacturing sector (in current ZAR/month)</td>
</tr>
<tr>
<td>Skilled Labor (A)</td>
</tr>
<tr>
<td>Unskilled Labor (B)</td>
</tr>
<tr>
<td>Real Wage Skilled Labor (C)</td>
</tr>
<tr>
<td>Real Wage Unskilled Labor (D)</td>
</tr>
<tr>
<td>Relative Factor Costs (percent)</td>
</tr>
<tr>
<td>Change in Unit Labor Cost</td>
</tr>
<tr>
<td>Change in User Capital Cost</td>
</tr>
<tr>
<td>Change in Relative (Lab/Cap) Cost</td>
</tr>
<tr>
<td>Wage Employment (thousands)</td>
</tr>
<tr>
<td>Demand for Skilled labor</td>
</tr>
<tr>
<td>Demand for Unskilled labor</td>
</tr>
<tr>
<td>Total Government employment</td>
</tr>
<tr>
<td>Total non-Government employment</td>
</tr>
<tr>
<td>Total wage employment</td>
</tr>
<tr>
<td>New jobs vis-à-vis 1992</td>
</tr>
<tr>
<td>Wage Employment growth rate</td>
</tr>
<tr>
<td>Total non-Government employment</td>
</tr>
<tr>
<td>Total employment</td>
</tr>
<tr>
<td>Percent of Labor Force Out of Wage Employment</td>
</tr>
<tr>
<td>Skilled labor force</td>
</tr>
<tr>
<td>Unskilled labor force</td>
</tr>
<tr>
<td>Total labor (Skilled and Unskilled)</td>
</tr>
<tr>
<td>Productivity ratios (1985 prices)</td>
</tr>
<tr>
<td>Total Capital Stock</td>
</tr>
<tr>
<td>Non-Government Capital Stock</td>
</tr>
<tr>
<td>Spare Capacity (% of GDP)</td>
</tr>
</tbody>
</table>

### Notes
- **Annex A - Macroeconomic Model (SAMM) Part III**
- Page 232
<table>
<thead>
<tr>
<th>SOUTH AFRICA ASUMPTIONS OF DEMAND SHOCK EXPERIMENTS ON GOV. INVESTMENT AND THE SUPPLY CONSTRAINT 4/20/94-1931</th>
<th>SCENARIO C: SUPPLY ENHANCEMENT REVIVAL OF INVESTOR CONFIDENCE</th>
<th>SCENARIO D: SUP.ENHCT.+REV PRIV.CONT. LABOR-INTENSIVE TECHNOLOGY</th>
<th>SCENARIO E: SUP.ENHCT.+REV PRIV.CONT. LAB.-INT. TEC. &amp; FAVOR.EXT.ENVIR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual</td>
<td>Historic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Social and Political Climate**
- Number of strikes (1000 days lost)
- Bonus Increase on Real Wage (Unsk. %/year)
- Apartheid factor

**Skills Upgrading**
- Upgraded Unskilled Workers each year (thsd)
- Upgraded Unskilled Workers cumul. (thsd)
- Cumul. Upgrad. Workers / Tot. Skil. Lab. (%%)
- Cost of Upgrad. Unsk. Work. (% Gov. Cons.)

**Additional Private Investment Response**
- Private Investment Additional (over model)
- Add. Priv. Investment (% of GDP)

**Public Expenditure Policies**
- Government Investment (current ZAR Million)
- Government Investment (ZAR 1985 Million)
- Govern. Investment (real growth rate)
- Govern. Investment (% of GDP)
- Gov.Addit. Inv. / 1992 base (ZAR 85 Million)

**Parastatal Investment (current ZAR Million)**
- Parastatal Investment (ZAR 1985 Million)
- Par. Investment (real growth rate)
- Par. Investment (% of GDP)
- Government Employment (000)
- Govern. Employment (real growth rate)
- Govern. Employment (% of Total Emp)

---

Table A.9a: South Africa - Detailed Assumptions of Simulations (Scenarios C, D and E)  
(Sources: World Bank Staff projections)
## South Africa - Economic Performance and Policies

**Table A.9b: South Africa - Detailed Assumptions of Simulations (Scenarios C, D and E)**

(Source: World Bank Staff projections)

<table>
<thead>
<tr>
<th>SCENARIO C: SUPPLY ENHANCEMENT REVIVAL OF INVESTOR CONFIDENCE</th>
<th>SCENARIO D: SUP.ENHICT.+REV.PRIV.CONT. LABOR-INTENSIVE TECHNOLOGY</th>
<th>SCENARIO E: SUP.ENHICT.+REV.PRIV.CONT. LAB.-INT. TEC. &amp; FAVOR.EXT.ENVIR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>South Africa - Economic Performance and Policies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annex A: Macroeconomic Model (SAMM) Part III</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART IV:

EQUATIONS AND LIST OF VARIABLES OF THE SAMM
1. List of Variables of the SAMM

The following variables are used in the SAMM:

**ENDOGENOUS** about 300 variables in current prices unless otherwise specified, growth rates are noted with a Hat (\( \hat{GDP} \)) and changes over a period with a delta sign (\( \Delta GDP \)).

- \( CAB = \) Current Account Balance
- \( CGc = \) Government Consumption (Current Expenditures)
- \( (CPR)_{MIN} = \Phi(CPR) = \) Minimum Level of Private Consumption in 1985 prices
- \( COSTUP = \) Cost of Upgrading Unskilled Workers to Skilled Category
- \( CPI = \) Consumer Price Index (1985=100)
- \( CPR = \) Private Consumption in 1985 prices
- \( CPRC = \) Private Consumption
- \( CUSKUP = \) Cumulative Number of Unskilled workers upgraded to Skilled category (in thousands)
- \( DCD_F = \) Demand for Domestic Credit by Firms
- \( DC_F = \) Demand for Credit (Total) by Firms
- \( DCF_F = \) Demand for Foreign Credit by Firms
- \( DCG = \) Demand for Credit by Government
- \( DCH = \) Demand for Credit by Households
- \( DCTot = \) Total Demand for Credit in the economy
- \( DINF = \) Consumer Price Differential (South Africa / Industrialized Countries) (ratio)
- \( DINC = \) Private Disposable Income (Households and Non-Incorporated Business)
- \( E = \) Nominal Exchange Rate (Rands per US Dollar)
- \( EUSD = \) Nominal Exchange Rate (US Dollar per Rand)
- \( EUSD85 = \) Nominal Exchange Rate (Rands per US Dollar) 1985=100
- \( EXDE = \) Excess Demand in 1985 prices
- \( FCD = \) Fiscal Deficit/Surplus on Current Expenditures
- \( FD = \) Fiscal Deficit/Surplus (Total)
- \( FD_D = \) Portion of Fiscal Deficit financed through Increase in Gov's Domestic Debt
- \( FDDEBT = \) Firms' Domestic Borrowing Requirements (end-year)
- \( FDDOY = \) Ratio of Firms' Domestic Borrowing Requirements (end-year) over Gross Domestic Product
- \( FDExe = \) Portion of Fiscal Deficit not financed through Increase in Domestic Debt
- \( FD_F = \) Portion of Fiscal Deficit financed through Increase in Gov's Foreign Debt
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDRSTOY</td>
<td>Ratio of Total Foreign Debt (stock) over Gross Domestic Product (percent)</td>
</tr>
<tr>
<td>FDSTOD</td>
<td>Firms' Domestic Debt (end-year stock)</td>
</tr>
<tr>
<td>FFDEBT</td>
<td>Firms' Foreign Borrowing Requirements (end-year) in Rands</td>
</tr>
<tr>
<td>FFDOY</td>
<td>Ratio of Firms' Foreign Borrowing Requirements (end-year) over GDP (percent)</td>
</tr>
<tr>
<td>FDSTOD</td>
<td>Firms' Foreign Debt (end-year stock) in Rands</td>
</tr>
<tr>
<td>FODRD</td>
<td>South Africa's Total Foreign Borrowing Requirements (end-year) in Rands</td>
</tr>
<tr>
<td>FODRDAF</td>
<td>South Africa's Total Foreign &quot;Affected Debt&quot; (end-year) in Rands</td>
</tr>
<tr>
<td>FODRNAF</td>
<td>South Africa's Total Foreign &quot;Non-Affected Debt&quot; (end-year) in Rands</td>
</tr>
<tr>
<td>FODRSTO</td>
<td>South Africa's Total Foreign Debt (end-year stock) in Rands</td>
</tr>
<tr>
<td>FPD</td>
<td>Primary Fiscal Deficit/Surplus</td>
</tr>
<tr>
<td>FTDEBT</td>
<td>Firms' Total Borrowing Requirements (end-year) in Rands</td>
</tr>
<tr>
<td>FTOTEXP</td>
<td>Firms' Total Expenditures</td>
</tr>
<tr>
<td>FTSTOD</td>
<td>Firms' Total Debt (end-year stock) in Rands</td>
</tr>
<tr>
<td>GDDEBT</td>
<td>Government Domestic Borrowing Requirements (end-year)</td>
</tr>
<tr>
<td>GDDOY</td>
<td>Ratio of Government Domestic Borrowing Requirements (end-year) over GDP (percent)</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product at market prices in 1985 prices</td>
</tr>
<tr>
<td>GDPc</td>
<td>Gross Domestic Product at market prices</td>
</tr>
<tr>
<td>GDPFC</td>
<td>Gross Domestic Product at factor cost in 1985 prices</td>
</tr>
<tr>
<td>GDPFCC</td>
<td>Gross Domestic Product at factor cost</td>
</tr>
<tr>
<td>GDPNG</td>
<td>Gross Non-Government Domestic Product in 1985 prices</td>
</tr>
<tr>
<td>GDSTOD</td>
<td>Government's Domestic Debt (end-year stock)</td>
</tr>
<tr>
<td>GFDEBT</td>
<td>Government's Foreign Borrowing Requirements (end-year) in Rands</td>
</tr>
<tr>
<td>GFDOY</td>
<td>Ratio of Government's Foreign Borrowing Requirements (end-year) over GDP (percent)</td>
</tr>
<tr>
<td>GFSTOD</td>
<td>Government's Foreign Debt (end-year stock) in Rands</td>
</tr>
<tr>
<td>GOPSTOT</td>
<td>Firms' Gross Operating Surplus (Total)</td>
</tr>
<tr>
<td>GS</td>
<td>Government Current Expenditures on Goods and Services</td>
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<tr>
<td>GSx</td>
<td>Government Current Expenditures on Goods and Services in 1985 prices</td>
</tr>
<tr>
<td>GTDEBT</td>
<td>Government's Total Borrowing Requirements (end-year) in Rands</td>
</tr>
<tr>
<td>GTOTEXP</td>
<td>Government Total Expenditures (Current and Capital)</td>
</tr>
<tr>
<td>GTSTOD</td>
<td>Government's Total Debt (end-year stock)</td>
</tr>
<tr>
<td>GVA</td>
<td>Government's Value-Added in 1985 prices</td>
</tr>
<tr>
<td>GWB</td>
<td>Government Expenditures on Wages and Salaries</td>
</tr>
<tr>
<td>I</td>
<td>Total Gross Domestic Fixed Investment in 1985 prices</td>
</tr>
<tr>
<td>IDTAXG</td>
<td>Total Indirect Taxes Paid to Government</td>
</tr>
<tr>
<td>IFIN</td>
<td>Gross Domestic Fixed Investment by Finance, Insurance, Real Estate Bus.</td>
</tr>
<tr>
<td>IGC</td>
<td>Gross Domestic Fixed Investment by Government</td>
</tr>
<tr>
<td>IMGNSF</td>
<td>Import of Goods and Non-Factor Services in 1985 prices</td>
</tr>
<tr>
<td>IMNO</td>
<td>Import of Non-Oil Goods and Non-Factor Services in 1985 prices</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>IMothk</td>
<td>Import of Oil, Other Goods and Non-Factor Services in 1985 prices</td>
</tr>
<tr>
<td>INCc</td>
<td>Private Income (Households and Non-Incorporated Business)</td>
</tr>
<tr>
<td>INCf</td>
<td>Total Income (Firms and Corporate Business)</td>
</tr>
<tr>
<td>INCoth</td>
<td>Private Other Income (Households and Non-Incorporated Business)</td>
</tr>
<tr>
<td>INCproh</td>
<td>Private Income from Property (Households and Non-Incorporated Business)</td>
</tr>
<tr>
<td>INCpropf</td>
<td>Income from Property Payments (Firms and Corporate Business)</td>
</tr>
<tr>
<td>INCpropf</td>
<td>Income from Property Receipts (Firms and Corporate Business)</td>
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<tr>
<td>INT</td>
<td>Nominal Money Market Interest Rate (percent)</td>
</tr>
<tr>
<td>INTmax</td>
<td>Yearly Cap on the Nominal Money Market Interest Rate (percent)</td>
</tr>
<tr>
<td>INTtb</td>
<td>Nominal Treasury Bill Tender Rate (percent)</td>
</tr>
<tr>
<td>IP</td>
<td>Interest Payment by Government on its Total Debt</td>
</tr>
<tr>
<td>IPfoord</td>
<td>Interest Payment by South Africa on its Total Long-Term Foreign Debt (Affected and Non-Affected), and its Total Short-Term Foreign Debt</td>
</tr>
<tr>
<td>IPff</td>
<td>Interest paid by the corporate sector (all firms) on its total stock of Debt</td>
</tr>
<tr>
<td>IPrf</td>
<td>Interest received by the corporate sector (all firms) on its total stock of Debt</td>
</tr>
<tr>
<td>IPrh</td>
<td>Gross Domestic Fixed Investment by Households in Housing in 1985 prices</td>
</tr>
<tr>
<td>IPrnh</td>
<td>Gross Domestic Non-Housing Fixed Investment by the Private Sector in 1985 prices</td>
</tr>
<tr>
<td>K</td>
<td>Total Capital Stock in 1985 prices</td>
</tr>
<tr>
<td>Kfin</td>
<td>Capital Stock in 1985 prices of Finance, Insurance, Real Estate Business</td>
</tr>
<tr>
<td>Kg</td>
<td>Capital Stock in 1985 prices of Government</td>
</tr>
<tr>
<td>Kgok</td>
<td>Ratio of Capital Stock in 1985 prices of Government over Total Capital Stock in 1985 prices</td>
</tr>
<tr>
<td>Knsg</td>
<td>Capital Stock in 1985 prices of the Non-Government sector</td>
</tr>
<tr>
<td>Kprnh</td>
<td>Capital Stock in 1985 prices of the Private sector (Non-Housing)</td>
</tr>
<tr>
<td>L</td>
<td>Total Labor Demand (Skilled and Unskilled) (in thousands)</td>
</tr>
<tr>
<td>LDsk</td>
<td>Total Labor Demand (Skilled) (in thousands)</td>
</tr>
<tr>
<td>LDuns</td>
<td>Total Labor Demand (Unskilled) (in thousands)</td>
</tr>
<tr>
<td>Lfull</td>
<td>Estimated level of Full employment of Skilled Labor (in thousands)</td>
</tr>
<tr>
<td>LGsk</td>
<td>Government Labor Demand for Skilled Workers (in thousands)</td>
</tr>
<tr>
<td>LGuns</td>
<td>Government Labor Demand for Unskilled Workers (in thousands)</td>
</tr>
<tr>
<td>Lngsk</td>
<td>Labor Demand for Skilled Workers in the Non-Government sector (in thousands)</td>
</tr>
<tr>
<td>Lnguns</td>
<td>Labor Demand for Unskilled Workers in the Non-Government sector (in thousands)</td>
</tr>
<tr>
<td>Lsk = Lwhi</td>
<td>Labor Supply of Whites/Skilled Workers in the Non-Government sector (in thousands)</td>
</tr>
</tbody>
</table>
South Africa - Economic Performance and Policies

$LSTot =$ Total Labor Supply of African/Unskilled, Colored, Asians and Whites/Skilled Workers in the Non-Government sector (in thousands)

$LTKM =$ Long-Term Capital Movements

$M2 =$ Coins and Bank Notes in Circulation, Checking, Transmission and Other Demand Deposits and Other Short-Term and Medium-Term Deposits

$\Delta NFA =$ Change in Net Foreign Assets

$NFS =$ Payments of Non-Factor Services

$ONFS =$ Payments of Factor Services

$OPS =$ Operating Surplus of the Corporate sector (Firms)

$OTCGC =$ Government's Other Consumption (Other Recurrent Expenditures)

$OTHFEX =$ Firms' Other Consumption (Other Expenditures)

$OTHHEX =$ Households' Other Consumption (Other Expenditures)

$P =$ GDP Deflator (1985=100)

$PEX =$ Export Price (Total Exports) (1985=100)

$PEXNG =$ Export Price (Non-Gold Exports) (1985=100)

$PG =$ Government Expenditure Deflator (1985=100)

$PGO = Price of Gold in Rand (Rands/Ounce) 1985=100

$PGOLOD =$ Price of Gold in Rand (Rands/Ounce)

$PM =$ Import Price (Total Imports) (1985=100)

$PINN =$ Price of Investment (1985=100)

$PINNP =$ Price of Investment in Non-Housing (1985=100)

$PP =$ Producer Price (1985=100)

$PROF =$ Savings Ratio of Firms (Corporate Savings over Income) (percent)

$\Pi =$ Average Yield/Profit in the Corporate sector (percent)

$PW =$ Wholesale Industrialized Countries Prices in US Dollars (1985=100)

$RCWUS =$ Real Consumer Wage of Unskilled Labor (1985 Rands / months)

$RCWINS =$ Real Consumer Wage of Skilled Labor (1985 Rands / months)

$RESA =$ South Africa's level of Gross Reserves

$\Delta RESE =$ South Africa's Change in the Level of Gross Reserves

$\Delta RESAR =$ South Africa's targeted Change in the Level of Gross Reserves

$\Delta RESERADD =$ Change in Reserves above targeted level of Reserves

$RINT =$ Real Money Market Interest Rate (percent)

$RINTS =$ Real Money Market Interest Rate (1985=100)

$RINTFO =$ Real Foreign Interest Rate (percent)

$SALc =$ Annual Wage Income of Households

$SAVF =$ Savings of Corporate sector (Firms)

$SAH =$ Savings of Households

$SAVTOT =$ Total Savings including Government's

$SKLGA =$ Number of additional skilled workers needed in a given year (thousands)

$SKLUCP =$ Number of additional skilled workers that existing training institution can upgrade in any given year (thousands)

$SKLULP =$ Number of additional unskilled workers upgraded in a given year (thousands)
**South Africa - Economic Performance and Policies**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPCAP</strong> =</td>
<td>Spare Capacity in the economy (percent of Non-Government GDP)</td>
</tr>
<tr>
<td><strong>STFODR</strong> =</td>
<td>Short-Term Foreign Debt (end-year Stock)</td>
</tr>
<tr>
<td><strong>STKM</strong> =</td>
<td>Short-Term Capital Movements</td>
</tr>
<tr>
<td><strong>SUB</strong> =</td>
<td>Subsidies to the Corporate sector from the Government's budget</td>
</tr>
<tr>
<td><strong>TFP</strong> =</td>
<td>Total Factor Productivity</td>
</tr>
<tr>
<td><strong>TGOS</strong> =</td>
<td>Taxes on Goods and Services (including VAT and previously GST)</td>
</tr>
<tr>
<td><strong>TGRANTS</strong> =</td>
<td>Transfers to the rest of the World from the Government's budget</td>
</tr>
<tr>
<td><strong>TIT</strong> =</td>
<td>Taxes on International Transactions in the Government's budget</td>
</tr>
<tr>
<td><strong>TNTAX</strong> =</td>
<td>Total Non-Tax Revenue in the Government's budget</td>
</tr>
<tr>
<td><strong>TOTH</strong> =</td>
<td>Transfers received from the rest of the World in the Government's budget</td>
</tr>
<tr>
<td><strong>TRAINER</strong> =</td>
<td>Number of skilled workers (Trainers) needed to upgrade unskilled workers in a given year (thousands)</td>
</tr>
<tr>
<td><strong>TRANS</strong> =</td>
<td>Transfers from Government's budget to Households</td>
</tr>
<tr>
<td><strong>TRDBAL</strong> =</td>
<td>Trade (Goods and Non-Factor Services) Balance in 1985 prices</td>
</tr>
<tr>
<td><strong>TRDBLC</strong> =</td>
<td>Trade (Goods and Non-Factor Services) Balance</td>
</tr>
<tr>
<td><strong>TREV</strong> =</td>
<td>Total Government's Revenue</td>
</tr>
<tr>
<td><strong>TSSC</strong> =</td>
<td>Total Transfers to the Government's budget</td>
</tr>
<tr>
<td><strong>TSSCF</strong> =</td>
<td>Transfers from the Corporate sector (Firms) to the Government's budget</td>
</tr>
<tr>
<td><strong>TSSCH</strong> =</td>
<td>Transfers from Households to the Government's budget</td>
</tr>
<tr>
<td><strong>TT</strong> =</td>
<td>Terms of Trade (Total) (1985=100)</td>
</tr>
<tr>
<td><strong>TTAX</strong> =</td>
<td>Total Government's Tax Revenue</td>
</tr>
<tr>
<td><strong>TTNG</strong> =</td>
<td>Terms of Trade (Non-Gold) (1985=100)</td>
</tr>
<tr>
<td><strong>UCKPRv</strong> =</td>
<td>User Cost of Capital (Private sector) (percent)</td>
</tr>
<tr>
<td><strong>UNsk</strong> =</td>
<td>Unemployment of Skilled labor (percent of Skilled labor force)</td>
</tr>
<tr>
<td><strong>UNIns</strong> =</td>
<td>Unemployment of Unskilled labor (percent of Unskilled labor force)</td>
</tr>
<tr>
<td><strong>UNProp</strong> =</td>
<td>Estimated level of Minimal Unemployment of Skilled Labor (in percent)</td>
</tr>
<tr>
<td><strong>UTOT</strong> =</td>
<td>Total unemployment (percent of total labor force)</td>
</tr>
<tr>
<td><strong>VDEPtotC</strong> =</td>
<td>Provision for Depreciation</td>
</tr>
<tr>
<td><strong>WMAuns</strong> =</td>
<td>Average monthly wage for unskilled workers in the Manufacturing sector</td>
</tr>
<tr>
<td><strong>WMAwh = WMAsk</strong> =</td>
<td>Average monthly wage for skilled workers in the Manufacturing sector</td>
</tr>
<tr>
<td><strong>WNOQ</strong> =</td>
<td>Unit Labor Cost (ratio of Annual Wage Income over GDP in 1985 prices)</td>
</tr>
<tr>
<td><strong>WPIC</strong> =</td>
<td>Wholesale Price in USD of industrialized countries (1985=100)</td>
</tr>
<tr>
<td><strong>WPICRA</strong> =</td>
<td>Wholesale Price in Rands of industrialized countries (1985=100)</td>
</tr>
<tr>
<td><strong>XGNS</strong> =</td>
<td>Exports of Goods and Non-Factor Services in 1985 prices</td>
</tr>
<tr>
<td><strong>XGOLDK</strong> =</td>
<td>Exports of Gold in 1985 prices</td>
</tr>
<tr>
<td><strong>XNG</strong> =</td>
<td>Exports of Non-Gold Goods and Non-Factor Services in 1985 prices</td>
</tr>
<tr>
<td><strong>YP =</strong></td>
<td>Potential Non-Government Gross Domestic Product</td>
</tr>
</tbody>
</table>
**EXOGENOUS** (about 60 variables in current prices unless otherwise specified)

- **APART** = A measure of the intensity of enforcement of Apartheid legislation: annual ratio of prosecutions under internal mobility control regulations over the employment of Africans (percent)
- **ΔINV** = Change in Inventories in 1985 prices
- **ΔINVC** = Change in Inventories
- **CPIc** = Consumer Price Index of industrialized countries (1985=100)
- **DEMSHO\textsubscript{CG}** = Demand Shock composed of additional exogenous Government recurrent expenditures in 1985 prices
- **DEMSHO\textsubscript{IG}** = Demand Shock composed of additional exogenous Government investment expenditures in 1985 prices
- **DEMSHO\textsubscript{PAR}** = Demand Shock composed of additional exogenous Parastatals investment expenditures in 1985 prices
- **DEMSHO\textsubscript{PR}** = Demand Shock composed of additional exogenous Private firms investment expenditures in 1985 prices
- **DEP\textsubscript{FIN}** = Depreciation rate of the capital stock of Finance, Insurance, Real Estate Business (percent)
- **DEP\textsubscript{G}** = Depreciation rate of the capital stock of Government (percent)
- **DEP\textsubscript{PAR}** = Depreciation rate of the capital stock of Parastatals (percent)
- **DEP\textsubscript{PR}** = Depreciation rate of the capital stock of Private firms (percent)
- **DEP\textsubscript{TOT}** = Depreciation rate of total capital stock (percent)
- **GOLDGRA** = Annual average yield of Gold extraction (Grams of Gold per Ton of Ore)
- **IG** = Government Gross Domestic Fixed Investment in 1985 prices
- **INCPROG** = Income from property accruing to Government
- **INTFOD** = Nominal Interest Rate on Long-Term Foreign Debt (percent)
- **IPIC** = Industrial Production Index in industrialized countries (1985=100)
- **LDSAF** = Employment of Domestic Servants (Africans) (thousands)
- **LDSAS** = Employment of Domestic Servants (Asians) (thousands)
- **LDSco** = Employment of Domestic Servants (Colored) (thousands)
- **LDSTot** = Employment of Domestic Servants (Total) (thousands)
- **LDSWH** = Employment of Domestic Servants (Whites) (thousands)
- **LG** = Employment by Government (Total) (thousands)
- **LGAf** = Employment of Africans by Government (thousands)
- **LGA** = Employment of Asians by Government (thousands)
- **LGC** = Employment of Colored by Government (thousands)
- **LGH** = Employment of Whites by Government (thousands)
- **LGADPS** = Additional employment (total) in the Service sectors resulting from additional Government recurrent expenditures (the above Demand Shock) (in thousands)
- **LGADPS\textsubscript{SK}** = Additional employment (skilled) in the Service sectors resulting from additional Government recurrent expenditures (the above Demand Shock) (in thousands)
\( LGADPUNS = \) Additional employment (unskilled) in the Service sectors resulting from additional Government recurrent expenditures (the above Demand Shock) (in thousands)

\( LGADPWC = \) Additional employment (total) in the Construction and Public Works sectors resulting from additional Government investment expenditures (the above Demand Shock) (in thousands)

\( LGADPWC_{SK} = \) Additional employment (skilled) in the Construction and Public Works sectors resulting from additional Government investment expenditures (the above Demand Shock) (in thousands)

\( LGADPWC_{UNS} = \) Additional employment (unskilled) in the Construction and Public Works sectors resulting from additional Government investment expenditures (the above Demand Shock) (in thousands)

\( LS_{AF} = \) Labor Supply of African (Unskilled) Workers (thousands)

\( LS_{AS} = \) Labor Supply of Asian (Unskilled) Workers (thousands)

\( LS_{CO} = \) Labor Supply of Colored (Unskilled) Workers (thousands)

\( LS_{WH} = \) Labor Supply of White (Skilled) Workers (thousands)

\( LCON = \) Total Employment (Skilled and Unskilled) in the Construction sector (in thousands)

\( LSER = \) Total Employment (Skilled and Unskilled) in the Services sector (in thousands)

\( NSTRIKE = \) A measure of the quality of industrial relations: annual average of lost working days due to labor strikes (in thousands)

\( OTHIG_{OC} = \) Other acquisition of assets by Government (Investment other than fixed)

\( PGOLD_{USD} = \) Price of Gold (US Dollars per Tr. Ounce) London

\( POIL_{USD} = \) Price of Oil (US Dollars per Barrel) Venezuelan, Spot

\( POPTOT = \) Total Population of South Africa (RSA and TBVC) (thousands)

\( PROVD_{GO} = \) Provision for depreciation of Government Capital Stock

\( Q_{CON} = \) Total Production (Value) in the Construction sector

\( Q_{SER} = \) Total Production (Value) in the Services sector

\( RBFA_{AC} = \) Reserve Bank accommodation factor (on growth of Money Supply)

\( SPRDFIR = \) Spread on borrowing nominal foreign interest rates for Firms (percent)

\( SPRD_{GOV} = \) Spread on borrowing nominal foreign interest rates for South Africa's Government (percent)

Other variables

\( DUMMY_{S} = \) Dummy for a given year s

\( DUMSANC = \) Dummy for financial sanctions (equals 1 after 1985)
2. List of Equations of the SAMM

The SAMM includes the following equations: (in what follows and when appropriate, the relevant constant term for each equation is always noted $\Theta_{VAR}$ with the subscript VAR referring to the relevant variable name).

**RELATIVE FACTOR DEMAND**

**RELATIVE FACTOR PRICE: REAL USER COST OF CAPITAL, REAL PRODUCT WAGE UNSKILLED LABOR**

\[
LRNWE = \sum_{i=1}^{3} \alpha_i LRNW_{(t - i)}; \sum_{i=1}^{3} \alpha_i = 1
\]

\[
LRNW = \log(RNW)
\]

\[
RNW = \frac{RUCK}{RWUMAP}
\]

\[
RUCK = P_{KPRNH} \cdot \left[ \left( \sum_{i=1}^{3} \beta_i \hat{J}NT_{(t - i)} \right) - \left( \sum_{i=1}^{3} \theta_i \hat{P}_{(t - i)} \right) + DEP_{PRV} \right] - \left( 1 - DEP_{PRV} \right) \cdot \hat{P}_{KPRNH}
\]

\[
RWUMAP = \frac{WMA_{UNS}}{P}
\]

\[
P_{KPRNH} = \frac{P_{INVPRNH}}{P}
\]

---

**Equation [1]**

\[
\left( \frac{K_{NG}}{L_{NGUNS}} \right) = (\Theta_{KL}) \cdot RNWE^{t_2} \cdot \left( \frac{K_G}{K_{NG}} \right)^{t_3} \left( \frac{P_{EXNG}}{P_{IM}} \right)^{t_4}
\]
RELATIVE FACTOR PRICE: RELATIVE PRICE OF Q, REAL PRODUCT WAGE SKILLED LABOR

\[
LRQWH = \log\left( \frac{RQ}{(WMAwh / P)} \right)
\]

\[
RQ = \left[ (RUCK. K_{NG}) + (RWUMAP. L_{NGUNS}) \right] \div Q
\]

\[
QS = \frac{Q}{L_{NGSK}}
\]

\[
LRQWRE = \sum_{i=1}^{3} \lambda_i LRQWH(t-i), \sum_{i=1}^{3} \lambda_i = 1
\]

\[
\text{Equation [2]} \quad \left( \frac{Q}{L_{NGSK}} \right) = (\Theta QL). RQWRE^{\mu_2}. \left( K_{NG} \right)^{\mu_3}. \left( \frac{P_{EXNG}}{P_{IM}} \right)^{\mu_4}
\]

FULL EMPLOYMENT AND MINIMUM UNEMPLOYMENT LEVEL OF SKILLED LABOR FACTOR

\[
LFULL = [(1 - UN_{PROP}). LS_{sk} - L_{GSK} - LDS_{sk}]
\]

\[
UN_{PROP} = \text{Min}[UN_{sk(t)}], t = 1960 - 1992
\]
\[
\begin{align*}
\text{PRODUCTION} & = \lambda \\
\xi_\theta \left[ \xi_\theta \left( \xi_\theta^{d \cdot L}(g - 1) + \xi_\theta \xi_\theta^{d \cdot N}(\alpha - 1) + \xi_\theta \xi_\theta^{d \cdot N}(\alpha') \right) \right] = \xi_\theta \\
\end{align*}
\]

\[
\begin{align*}
\xi_\theta \left( \xi_\theta^{d \cdot L}(g - 1) + \xi_\theta \xi_\theta^{d \cdot N}(\alpha - 1) + \xi_\theta \xi_\theta^{d \cdot N}(\alpha') \right) & = \xi_\theta \\
\frac{\xi_\theta}{\xi_\theta^2 + 1} & = \xi_\theta \\
\end{align*}
\]

\[
\begin{align*}
\left[ \left( \frac{(t-1)}{\xi_\theta} \left( \frac{\xi_\theta^{d \cdot L}}{\xi_\theta^{d \cdot N}(\alpha - 1) + \xi_\theta \xi_\theta^{d \cdot N}(\alpha') \left( \xi_\theta^{d \cdot N}(\alpha') \right) - 1 \right) \right) \right] & = \xi_\theta \\
\frac{\xi_\theta}{\xi_\theta^2 + 1} & = \xi_\theta \\
\end{align*}
\]

\[
\begin{align*}
\left[ \left( \frac{(t-1)}{\xi_\theta} \left( \frac{\xi_\theta^{d \cdot L}}{\xi_\theta^{d \cdot N}(\alpha - 1) + \xi_\theta \xi_\theta^{d \cdot N}(\alpha') \left( \xi_\theta^{d \cdot N}(\alpha') \right) - 1 \right) \right) \right] & = \alpha \\
\frac{\xi_\theta}{\xi_\theta^2 + 1} & = \alpha \\
\end{align*}
\]

\[
\text{TW-LEVEL CES PRODUCTION FUNCTION}
\]
LEVEL OF FULL EMPLOYMENT PRODUCTION (POTENTIAL)

Equation [4]

\[ Y_F = TFP_{Max} \left[ \beta \left\{ \left( \alpha. K_{NG} + (1 - \alpha). L_{NGUNS} \right)^{\rho 2} \right\}^{\rho 3} \right]^{\frac{1}{\rho 3}} + (1 - \beta) \left( LF_{FULL} + LC_{USKUP} \cdot (1 - UNPROP) \right) \]

TOTAL FACTOR PRODUCTIVITY, SPARE CAPACITY

\[ TFP_i = \left( \frac{GDP_{NG(t)}}{Y(t)} \right), t = 1960 - 1992 \]

\[ TFP_{Max(t)} = \text{Max} \{ TFP_i(t), TFP_i(t-1) \}, t = 1960 - 1992 \]

\[ TFP_i = TFP_i(t-1) \cdot (1 + \Omega), t = 1993 - 2007 \]

\[ SPCAP = \left( \frac{(Y_F - GDP_{NG})}{Y_F} \right) \]

GROSS DOMESTIC INVESTMENT

PRIVATE INVESTMENT BY FIRMS (NON-HOUSING)

\[ RINT = \left[ INT - CPI \right] \]

\[ \Pi = \left[ \frac{SAVF}{INCF} - INT \right] \]

Equation [5a]

\[ \frac{I_{PRNOH}}{K_{PRNOH}} = \phi_{PRNOH} = C + \alpha. GDP_{(t-1)} + \beta. RINT_{(t-2)} + \chi. \Pi + \rho. \left( \frac{I_{PRNOH}}{K_{PRNOH}} \right)_{(t-1)} \]
\[ \varphi_{\text{MIN}} \leq \left( \frac{I_{\text{PRNOH}}}{K_{\text{PRNOH}}} \right) \leq \varphi_{\text{MAX}} \]
\[ \varphi_{\text{MIN}} = f(\text{DEP}_{\text{PRV}}) \]
\[ \varphi_{\text{MAX}} = \text{MEAN} \left( \frac{I_{\text{PRNOH}}}{K_{\text{PRNOH}}} \right)_{(1970 - 1980)} \]

Equation [5b.] \( I_{\text{PRNOH}} = \varphi_{\text{PRNOH}} \cdot K_{\text{PRNOH}} \)

INVESTMENT IN HOUSING BY HOUSEHOLDS

\[ \text{DRINC} = \left( \frac{\text{DINC}}{\text{CPI}} \right) \]

Equation [6] \( I_{\text{PRH}} = \text{DRINC}_{(t-1)} \cdot \left( \frac{\text{P}_{\text{INV}}}{\text{CPI}_{(t-1)}} \right)^{\beta} \cdot \text{RINT}^{\beta} \cdot \left( \frac{\text{CPI}}{\text{CPI}_{(t-1)}} \right) \cdot \Theta_{\text{IPRH}} \)

INVESTMENT BY PARASTATALS

Equation [7] \( I_{\text{PAR}} = \text{GDP}_{(t-1)} \cdot \left( \frac{\text{CPI}}{\text{CPI}_{(t-1)}} \right) \cdot \Theta_{\text{IPAR}} \)

INVESTMENT BY FINANCIAL INSTITUTIONS IN REAL ESTATE

Equation [8] \( I_{\text{FIN}} = \text{GDP}_{(t-1)} \cdot I_{\text{PRH}} \cdot \Theta_{\text{IFIN}} \)

TOTAL GROSS DOMESTIC INVESTMENT

Equation [9] \( I = I_{\text{PRH}} + I_{\text{PRNOH}} + I_{\text{G}} + I_{\text{PAR}} \)
CAPITAL STOCK ACCUMULATION

PRIVATE CAPITAL STOCK NON-HOUSING

Equation [10] \( K_{PRNH} = [K_{PRNH(t-1)}, (1 - DEP_{PRV}) + I_{PRNOH}] \)

PARASTATALS CAPITAL STOCK

Equation [11] \( K_{PAR} = [K_{PAR(t-1)}, (1 - DEP_{PAR}) + I_{PAR}] \)

FINANCIAL INSTITUTIONS CAPITAL STOCK

Equation [12] \( K_{FIN} = [K_{FIN(t-1)}, (1 - DEP_{FIN}) + I_{FIN}] \)

GOVERNMENT CAPITAL STOCK

Equation [13] \( K_{G} = [K_{G(t-1)}, (1 - DEP_{G}) + I_{G}] \)

NON-GOVERNMENT CAPITAL STOCK

Equation [14] \( K_{NG} = K - K_{G} - K_{FIN} \)

TOTAL CAPITAL STOCK

Equation [15] \( K = [K_{(t-1)}, (1 - DEP_{TOT}) + I] \)
PRIVATE CONSUMPTION

Equation [16]

\[ C_{PR}^* = \alpha C_{PR(t-1)} + \beta DRINC + \chi RINT_{(t-1)} + \delta \left( \frac{CPI}{CPIc} \right)_{(t-1)} + \eta U\bar{UNS} + \phi DUMSANC \]

\[ C_{PR} = \text{Max}[\{C_{PR}\}_{\text{MIN}}, \{C_{PR}^* - \phi, \text{EXDE}\}] \]

\[ \{C_{PR}\}_{\text{MIN}} = f(C_{PR}) \]

\[ C_{PRC} = CPI . C_{PR} \]

EXPORTS OF GOODS AND NFS

EXPORTS OF NON-GOLD GOODS AND NON-FACTOR SERVICES

Equation [17]

\[ X_{NG} = \Theta X_{NG} . (IPIC)^{a} \left( \frac{P_{EXNG}}{WPIC} \right)^{b} . DUMSANC^{x} \]

EXPORTS OF GOLD

Equation [18]

\[ X_{GOLDK} = f(GOLDGRA) \]

TOTAL EXPORTS

Equation [19]

\[ X_{GNFS} = X_{NG} + X_{GOLDK} - \varphi \cdot \text{EXDE} \]

IMPORTS OF GOODS AND NON-FACTOR SERVICES

IMPORTS OF NON-OIL GOODS AND NON-FACTOR SERVICES

Equation [20]

\[ IM_{NO} = \Theta_{IMNO} . GDP^{a} \left( \frac{P_{IMNO}}{CPI} \right)^{b} \left( \frac{P_{EX}}{P_{IM}} \right)_{(t-1)}^{x} \]

IMPORTS OF OIL (OTHER GOODS) AND NON-FACTOR SERVICES

Equation [21]

\[ IM_{OTHK} = IM_{OTHK} \]

TOTAL IMPORTS OF GOODS AND NON-FACTOR SERVICES

Equation [22]

\[ IM_{GNFS} = IM_{NO} + IM_{OTHK} + \varphi \cdot \text{EXDE} \]
DEMAND SUPPLY IDENTITY

\[ \Delta \text{INV} = \Delta \text{INV} \]
\[ \text{GDP}_{\text{FCC}} = \text{GDP}_c - \text{IDTAX}_G + \text{SUB} \]
\[ \text{GDP}^*_\text{NG} = (\text{GDP}_{\text{FC}} - \text{GVA}) \]
\[ \text{GDP}_{\text{NG}} = \text{Min}[(\text{GDP}_{\text{FC}} - \text{GVA}), \text{Y}_f] \]
\[ \text{EXDE} = (\text{GDP}^*_\text{NG} - \text{Y}_f) \]

IN VOLUME TERMS

Equation [23] \[ \text{GDP} = C_{PR} + \text{GS}_X + \left( \frac{\text{GWB}}{P_G} \right) + I + X_{GNFS} - \text{IM}_{GNFS} + \Delta \text{INV} \]

IN VALUE TERMS

Equation [24] \[ \text{GDP}_c = \text{CPI}.C_{PR} + P_G.\text{GS}_X + \text{GWB} + P_{\text{INV}}.I + P_{\text{EX}}.X_{GNFS} - P_{\text{IM}}.\text{IM}_{GNFS} + \Delta \text{INV}_c \]

GDP DEFLATOR

\[ P = \left( \frac{\text{GDP}_c}{\text{GDP}} \right) \]

GDP AT FACTOR COST CURRENT PRICES

\[ \text{GDP}_{\text{FCC}} = \text{GDP}_c - \text{IDTAX}_G + \text{SUB} \]

GDP AT FACTOR COST CONSTANT

\[ \text{GDP}_{\text{FC}} = \left( \frac{\text{GDP}_{\text{FCC}}}{P} \right) \]

GOVERNMENT VALUE-ADDED

\[ \text{GVA} = \alpha.L_G + C \]
PRICES

PRODUCER PRICE

Equations [25a.] & [25b.]

\[ P_P = \rho \cdot P_P(t-1) + \alpha \cdot WNQ + \beta \cdot SP\hat{C}AP_{(t-2)} + \chi \cdot DUMMY80 \]

\[ PP = \{ PP(t-1) \cdot (1 + \hat{P}) \} \]

IMPORT PRICE

Equations [26a.] & [26b.]

\[ P_{WF} = \alpha \cdot WPIC + \beta \cdot DUMSANC \]

\[ P_{IM} = (E \cdot P_{WF}) \]

EXPORT PRICE GOLD AND NON-GOLD

Equations [27a.] & [27b.]

\[ P_{EXNG} = (E \cdot WPIC)^{(1-\alpha)} \cdot (PP)^{\alpha} \cdot DUMMY74 \]

\[ P_{EX} = P_{EXNG} \cdot \left( \frac{X_{NG}}{X_{GNFS}} \right) + P_{GOLD} \cdot \left( \frac{X_{GOLDK}}{X_{GNFS}} \right) \]

INVESTMENT PRICE

Equation [28]

\[ P_{INV} = (P_M)^{(1-\alpha)} \cdot (PP)^{\alpha} \cdot (SP\hat{C}AP)^{\delta} \cdot C \]

CONSUMER PRICE

Equation [29]

\[ CPI = (P_M)^{(1-\theta)} \cdot (PP)^{\theta} \]

GOVERNMENT CONSUMPTION PRICE DEFLATOR

Equation [30]

\[ P_G = (P_{INV})^{(1-\lambda)} \cdot (CPI)^{\lambda} \]
EMployment and Labor

Demand for Labor Deriving from CES Production Function

Equations [31a.] and [31b.]

\[
\begin{align*}
\log(L_{NGUNS}) &= \log(K_{NG}) - \log \left( \frac{K_{NG}}{L_{NGUNS}} \right) \\
L_{NGUNS} &= L_{NGUNS} - L_{SKLUP} + L_{GADPUNS} + L_{GADFWCUNS}
\end{align*}
\]

Equations [32a.] and [32b.]

\[
\begin{align*}
\log(L_{NGSK}) &= \log(Q) - \log(QS) \\
L_{NGSK} &= \min\left(\left(L_{NGSK} + L_{GADPSSK} + L_{GADFWCSDK}\right), (L_{FULL} + CUSKUP)\right)
\end{align*}
\]

Total Labor Demand

Equation [33]

\[
L = L_{NGUNS} + L_{NGSK} + LD_{STOT} + LG
\]

Total Labor Demand Unskilled (Government and Non-Government)

Equation [34]

\[
LD_{UNS} = L_{NGUNS} + LD_{STOT} + LG - LG_{SK} - LD_{SK}
\]

Total Labor Demand Skilled (Government and Non-Government)

Equation [35]

\[
LD_{SK} = L - LD_{UNS}
\]

Labor Supply

Equations [36a.], [36b.] & [36c.]

\[
\begin{align*}
L_{UNS} &= LS_{AF} + LS_{AS} + LS_{CO} - CUSKUP \\
L_{SK} &= LS_{WH} + CUSKUP \\
L_{STOT} &= L_{UNS} + L_{SK}
\end{align*}
\]
UNEMPLOYMENT TOTAL, UNSKILLED AND SKILLED

\[ U_{\text{Tot}} = \frac{(L_{\text{Stot}} - L)}{L_{\text{Stot}}} \]

\[ U_{\text{Uns}} = \frac{(L_{\text{Uns}} - L_{\text{Duns}})}{L_{\text{Uns}}} \]

\[ U_{\text{Sk}} = \frac{(L_{\text{Sk}} - L_{\text{Dsk}})}{L_{\text{Sk}}} \]

REAL WAGE EQUATIONS

Equations [38a.], [38b.]

\[ RCW_{\text{Uns}} = \Theta_{\text{RCWUns}} \cdot (RCW_{\text{Uns}})^{\alpha_1} \cdot (RCW_{\text{Sk}})^{\alpha_1} \cdot U_{\text{Uns}}^{\beta_1} \cdot N_{\text{STRIKE}}^{\chi_1} \cdot \text{APART}^{\delta} \]

\[ RCW_{\text{Sk}} = \Theta_{\text{RCWSk}} \cdot (RCW_{\text{Sk}})^{\rho_2} \cdot U_{\text{Sk}}^{\beta_2} \cdot \left( \frac{GDP_{\text{NG}}}{L_{\text{NGS}}^{\chi_2}} \right) \]

NOMINAL WAGE EQUATIONS

Equations [39a.] & [39b.]

\[ W_{\text{MAuns}} = RCW_{\text{Uns}} \cdot CPI \]

\[ W_{\text{MAwh}} = RCW_{\text{Sk}} \cdot CPI \]

TAXES DIRECT AND INDIRECT (HOUSEHOLDS AND FIRMS)

Equations [40a.] & [40b.]

\[ DTAX_H = \Theta_{\text{DTAH}} \cdot INC^m \]

\[ DTAX_F = \eta_2 \cdot OPS_{F(t-1)} \]

TOTAL INDIRECT TAXES

Equation [41.]

\[ IDTAX_G = TGOS + TIT \]
GOVERNMENT ACCOUNT (FISCAL DEFICIT/SURPLUS)

REVENUE

\[ DTAX = DTAXH + DTAXF \]
\[ TTAX = DTAX + IDTAXG + TSSC \]
\[ INCPROG = \overline{INCPROG} \]
\[ PROVDG = DEPG.IGc \]
\[ TNTAX = TOTh + INCPROG + PROVDG \]
\[ TSSC = TSSCH + TSSCF \]
\[ TREV = TTAX + TNTAX \]

EXPENDITURES

\[ G\text{TOTEXP} = CGc + OTCGc + IP + IgC + OTHIc \]
\[ CGc = GS + GWB + COSTUP \]
\[ GS = GSk. Pg \]
\[ OTCGc = SUB + TGRANTS \]
\[ IP = IPc \]
\[ IgC = [Ig.(1 + \varepsilon) + DEMSHOG]. PBN \]
\[ OTHIc = \overline{OThIGc} \]

GOVERNMENT EXPENDITURES IN GOODS & SERVICES

Equation [42]. \[ GSk = \Theta_{GSk}. LGsk^a. LGuns^b. Ks^x + DEMSHOCG \]

GOVERNMENT WAGE BILL
\[ GWB = (12. \Phi.WMAwh). LGsk + (12. \Phi.WMAuns).(LG - LGsk) \]

INTEREST PAYMENTS ON GOVERNMENT'S DEBT
\[ IPc = \sum_{i=1}^{5} INTTB_{(t-i)}. GDDEBT_{(t-i)} + \sum_{i=1}^{5} INTTOD_{(t-i)} + SPRDgov). GFDEBT_{(t-i)} \]
**FISCAL BALANCE**

**Primary, Current and Total Fiscal Deficit/Surplus**

\[
FPD = TREV - C_G - OTC_G
\]

\[
FCD = SAV_G = TREV - C_G - OTC_G - IP
\]

\[
FD = TREV - G_{TOTE X P}
\]

**Households Account (Including Farmers & Non-Incorporated Business)**

**Income**

**Wage Income Based on Manuf Wages**

\[
SAL_c = [\Theta_{WMA UNS} \cdot (12 \cdot WMA UNS)]_L D_{UNS} + [\Theta_{WMA S K} \cdot (12 \cdot WMA S K)]_L D_{S K}
\]

**Other Revenue from Property**

Equation [43.]

\[
INC_{PROH} = \Theta_{INC_{PROH}} \cdot INT_{(I-1)} \cdot OP_{STO R}^B
\]

**Total Income**

\[
INC_c = SAL_c + INC_{PROH} + TRANS + INC_{OTH}
\]

**Expenditures and Disposable Income**

\[
\vartheta = 50\%
\]

\[
TSSC_H = \vartheta \cdot TSSC
\]

\[
DINC = INC_c - DTAX_H - TSSC_H
\]

**Savings**

\[
SAV_H = DINC - CPR_c - OTHHEX
\]
INCORPORATED FIRMS ACCOUNT (INCLUDING FINANCE & BANKING)

**REVENUE**

\[ \text{GOPSTot} = \text{GDP}_{FCC} - \text{SALc} \]
\[ \text{VDEP}_{TOTC} = (\text{DEP}_{TOT}), \text{P}_{INV}, K_{(t-1)} \]
\[ \text{OPSTot} = \text{GOPSTot} - \text{VDEP}_{TOTC} + \Delta \text{INV}_c \]
\[ \text{OPS}_f = \alpha \cdot \text{OPSTot} + \beta \cdot \text{DUMMY80} \]
\[ \text{INC}_f = \chi \cdot \text{OPS}_f + \epsilon \cdot \text{DUMMY80} \]
\[ \text{IPRF} = f(\text{IPPF}) \]
\[ \text{INC}_f = \text{OPS}_f + \text{IPRF} + \text{INC}_\text{PROF} \]

**EXPENDITURES**

\[ \text{PRE} = \text{PRE} \]
\[ \text{INT}_{\text{REX}} = \sum_{i=1}^{3} \theta_i \cdot \text{INT}_i, \sum_{i=1}^{3} \theta_i = 1 \]
\[ \text{IPPF} = \left[ (\text{INT}_{\text{REX}} + \text{PRE}) \cdot \text{FDDEBT}_{(t-1)} \right] + \left( \text{INT}_{\text{FDG}} + \text{SPRD}_{\text{FIR}} \right) \cdot \text{FFDEBT}_{(t-1)} \]
\[ \text{TSSCF} = (1 - \vartheta) \cdot \text{TSSC}_c \]
\[ \text{FTOTEXP} = \text{INC}_\text{PROF} + \text{IPPF} + \text{TSSCF} + \text{DTAX}_f + \text{OTHFEX} \]

**SAVINGS AND PROFITS**

\[ \text{PROF}_f = \left( \frac{\text{SAVF}}{\text{INC}_f} \right) \]
\[ \Pi = \text{PROF}_f - \text{INT}_c \]
\[ \text{SAVF} = \text{INC}_f - \text{FTOTEXP} \]
CORPORATE SECTOR'S TOTAL DEBT

\[ FD\text{DEBT} = FD\text{DEBT}_{(t-1)} + DCF \]
\[ FF\text{DEBT} = [(FODRD_{(t-1)} - GF\text{DEBT}_{(t-1)}) + DCFF] \]
\[ FT\text{DEBT} = FD\text{DEBT} + FF\text{DEBT} \]
\[ FF\text{STOD} = FF\text{DEBT} - DCFF \]
\[ FD\text{STOD} = FD\text{DEBT} - DCF \]
\[ FT\text{STOD} = FF\text{STOD} + FD\text{STOD} \]

MONETARY SECTOR

SAVINGS, CURRENT ACCOUNT AND BORROWING REQUIREMENTS

\[ SAV_{\text{TOT}} = CAB = SAV_f + SAV_h + FCD \]
\[ DCH = -SAV_h + IPRH, P_{INV} \]
\[ DCf = -CAB - FD + P_{INV}, (I_{FIN} + I_{PRNOH} + I_{PAR}) - SAV_h - SAV_f \]
\[ DCg = FD_{EXE} \]
\[ DCTOT = DCH + DCF + DCg \]

GROWTH OF THE MONEY SUPPLY

Equation [44.] \[ \hat{M}_2 = \alpha.C\hat{P}_I_{(t-1)} + \beta_i\hat{G}\hat{D}_P_{(t-1)} + RB_{FAC} \]
**DEMAND FOR DOMESTIC CREDIT BY THE CORPORATE SECTOR**

\[ DCD_F = \]

\((DCF), \text{Total Acc mod elation}\)

\[ [((AM2 - DCG - DCF) \geq 0) \& [(INT_{FOD} + SPRD_{FIR}) \geq (INT + PRE)]\]

or

\[ [\theta(A2 - DCG)], \theta = 10\%, \text{Minimum Borrowing}\]

\[ [((AM2 - DCG - DCF) \geq 0) \& [(INT_{FOD} + SPRD_{FIR}) < (INT + PRE)]\]

or

\( (AM2 - DCG), \text{Residual Crowded - Out}\)

\[ [((AM2 - DCG - DCF) < 0) \& [(INT_{FOD} + SPRD_{FIR}) \geq (INT + PRE)]\]

or

\[ [\theta(A2 - DCG)], \text{Residual Crowded - Out}, \theta = 10\%, \text{Minimum Borrowing}\]

\[ [((AM2 - DCG - DCF) < 0) \& [(INT_{FOD} + SPRD_{FIR}) < (INT + PRE)]\]

**DEMAND FOR FOREIGN CREDIT BY THE CORPORATE SECTOR**

\[ DCFF = DCF - DCD_F \]
FISCAL DEFICIT FINANCING

DOMESTIC BANK FINANCING OF FISCAL DEFICIT WHEN IT IS ABOVE $\xi_1$% OF GDP

$\xi_1 = 5\%$

$FD_{exe} = \text{Min}[0, (-FD - \xi_1 \cdot GDP_c)]$

DEBT FINANCING

FOREIGN DEBT

$\xi_2 = 10\%$

$FD_{FD} = \xi_2 \cdot FD$

$GFDEBT = [(1 + \hat{E}) \cdot GFDEBT_{(t-1)} - FD_{FD}]$

DOMESTIC DEBT

$FD_{DD} = (1 - \xi_2) \cdot FD - FD_{exe}$

$GDDEBT = GDDEBT_{(t-1)} - FD_{DD}$

GOVERNMENT DEBT

TOTAL GOVERNMENT DEBT

$GTDEBT = GDDEBT + GFDEBT$

GOVERNMENT DEBT STOCK END-PERIOD

$GFSTOD = GFDEBT + FD_{FD}$

$GDSTOD = GDDEBT + FD_{DD}$

$GTSTOD = GFSTOD + GDSTOD$
TBILL RATE

\[ INT_{TB} = \Theta_{INT_TB} + \alpha \cdot INT_{(t-1)} + \beta \cdot INT_{DR} + \chi \cdot \left( \frac{CPI}{CPIc} \right)_{(t-1)} \]

MONEY MARKET INTEREST RATE

\[ INT = \left( \frac{DC_{TOT}}{GDPc} \right)^{\alpha} \cdot INT_{DR}^{\beta} \cdot \Theta_{INT} \]

BALANCE OF PAYMENTS

TRADE BALANCE VOLUME AND CURRENT

\[ TRDBAL = X_{GNFS} - IM_{GNFS} \]
\[ TRDBLC = P_{EX} \cdot X_{GNFS} - P_{IM} \cdot IM_{GNFS} \]

CURRENT ACCOUNT BALANCE

INTEREST PAYMENTS, FACTOR SERVICES

\[ \zeta = 0.5\% \]
\[ \omega = 1.5\% \]

\[ IP_{FORD} = (INT_{FOD} \cdot FODR_{AFF}) + FODRD_{AF} - [(INT_{FOD} - \zeta) \cdot RES_{AC}] + STFODR \cdot (INT_{FOD} + \omega) \]
\[ NFS = ONFS + IP_{FORD} \]
\[ CAB = TRDBLC - NFS \]

\[ ONFS = \Theta_{ONFS} + \phi \cdot GDPc \]
LONG-TERM AND SHORT-TERM CAPITAL MOVEMENTS

Equation [48] \[ LTKM = C + \alpha \cdot TRDBLC + \beta \cdot INT + \chi \cdot DUMMY86 \]

\[ STKM = \Delta NFA - LTKM \]

STOCK AND REPAYMENT OF SHORT-TERM DEBT

\[ \delta = 100\% \]

\[ RPYSTD = \delta \cdot STKM(t-1) \]

\[ STFODR = [STFODR(t-1) + STKM - RPYSTD] \]

CHANGE IN NET FOREIGN ASSETS

\[ \Delta NFA = -(CAB) + \Delta RESER \]

\[ \theta = (1/12) \]

\[ \Delta RESER = \]

0 \(\iff\) \(\text{CAB} < \theta \cdot Pm \cdot IMGNS) \]

\(\text{or}\)

\[ \Delta RESER \iff \text{CAB} \geq \theta \cdot Pm \cdot IMGNS) \]
**RESERVE TARGET & RATE OF RESERVE ACCUMULATION IN MONTHS OF IMPORTS**

\[ \omega_1 = \frac{6}{12} \]
\[ \omega_2 = \frac{1}{12} \]

\[ \Delta RES \text{TAR} = \]
\[ 0 \iff (RESAC(t-1) \geq \omega_1 \cdot PIM \cdot IGNS) \]

or

\[ \omega_2 \cdot PIM \cdot IGNS \iff (RESAC(t-1) < \omega_1 \cdot PIM \cdot IGNS) \]

**LEVEL OF GROSS RESERVES**

\[ RESAC = RESAC(t-1) + \Delta RES + \Delta RES \text{ADD} \]

**FOREIGN DEBT**

**SCHEDULE OF REPAYMENTS OF:**

**AFFECTED-DEBT UNDER THE 1993 DEBT AGREEMENT**

\[ \text{FODR}_{DAF} = \sum_{i=1994}^{i=2001} \alpha_i \text{FODR}_{DAF}, \alpha_{1994} = 16\%, \alpha_{1995-2001} = 12\%. \]

**NON-AFFECTED DEBT**

\[ RPYLTD = \]

**STOCK OF DEBT**

\[ \text{FODR}_{NAF} = (1 + E) \cdot \text{FODR}_{NAF(t-1) + \Delta NFA - RPYLTD} \]
\[ \text{FODRD} = \text{FODR}_{DAF} + \text{FODR}_{NAF} \]
\[ \text{FODR}_{STO} = \text{FFSTOD} + \text{GFSTOD} \]
EXOGENOUS ASSUMPTIONS

DEPRECIATION RATES
\[ \text{DEPPRV} = \text{DEPPRV} \]
\[ \text{DEPPAR} = \text{DEPPAR} \]
\[ \text{DEPG} = \text{DEPG} \]
\[ \text{DEPTOT} = \text{DEPTOT} \]
\[ \text{DEPFIN} = \text{DEPFIN} \]

DEMAND SHOCKS
\[ \text{DEMSHO}_{CG} = \text{DEMSHO}_{CG} \]
\[ \text{DEMSHO}_{IG} = \text{DEMSHO}_{IG} \]
\[ \text{DEMSHO}_{PR} = \text{DEMSHO}_{PR} \]
\[ \text{DEMSHO}_{PAR} = \text{DEMSHO}_{PAR} \]

ADDITIONAL GOVERNMENT EMPLOYMENT
\[ L_{CON} = \Theta_{LCON} Q_{CON} \delta_{LCON} \]
\[ L_{GADPC} = \delta_{LCON} \left( \frac{\text{DEMSHO}_{IG}}{Q_{CON}} \right) L_{CON} \]
\[ L_{SER} = \Theta_{LSER} Q_{SER} \delta_{LSER} \]
\[ L_{GADPS} = \delta_{LSER} \left( \frac{\text{DEMSHO}_{CG}}{Q_{SER}} \right) L_{SER} \]

LABOR SUPPLY
\[ L_{SAF}(t) = (1 + \tau_{LSAF}) \cdot L_{SAF}(t-1) \]
\[ L_{SAS}(t) = (1 + \tau_{LSAS}) \cdot L_{SAS}(t-1) \]
\[ L_{SCO}(t) = (1 + \tau_{LSCO}) \cdot L_{SCO}(t-1) \]
\[ L_{SWH}(t) = (1 + \tau_{LSWH}) \cdot L_{SWH}(t-1) \]
SKILLS UPGRADING

\[ SKLGAP_{(t)} = \omega \cdot L_{sk_{(t)}} \]

\[ SKLUPCP_{(t)} = \varepsilon \cdot L_{sk_{(t-1)}} \cdot (1 + \partial), \varepsilon < \omega \]

\[ SKLUPL_{(t)} = \min\left[ SKLGAP_{(t)}, SKLUPCP_{(t)} \right] \]

\[ TRAINER_{(t)} = f\left( SKLUPCP_{(t)} \right) \]

\[ CUSKUP_{(t)} = \sum_{i=1}^{n} SKLUPL_{(t-i)} \]

\[ COSTUP = TRAINER \cdot (12 \cdot WMA_{wh}) + SKLUPL \cdot (12 \cdot WMA_{un}) \]

FOREIGN SECTOR

PRICES

\[ CPI_{(t-1)} = (1 + \phi_{CPI}) \cdot CPI_{(t-1)} \]

\[ WPIC_{(t-1)} = (1 + \phi_{WPIC}) \cdot WPIC_{(t-1)} \]

\[ PGOLD_{USD_{t-1}} = (1 + \phi_{GOLD}) \cdot PGOLD_{USD_{t-1}} \]

\[ POIL_{USD_{t-1}} = (1 + \phi_{POIL}) \cdot POIL_{USD_{t-1}} \]

DEMAND

\[ IP_{IC_{(t)}} = (1 + \delta_{IPIC}) \cdot IP_{IC_{(t-1)}} \]

\[ IMOTHX_{(t)} = (1 + GDOIM + \delta_{IMOTHX}) \cdot IMOTHX_{(t-1)} \]

GOVERNMENT POLICIES

\[ \tau_{VAT} = \tau_{IM} \]

\[ TGOS = \tau_{VAT} \cdot GDP_c \]

\[ TIT = \tau_{IM} \cdot (PIM \cdot IMGOFS) \]

\[ TOTH_{(t)} = (1 + CPIT + \lambda_{TOTH}) \cdot TOTH_{(t-1)} \]

\[ TGRANTS_{(t)} = (1 + CPIT) \cdot TGRANTS_{(t-1)} \]

\[ SUB_{(t)} = (1 + CPIT + \lambda_{CPIT}) \cdot SUB_{(t-1)} \]

\[ TRANS_{(t)} = (1 + CPIT + \lambda_{TRANS}) \cdot TRANS_{(t-1)} \]

NOMINAL EXCHANGE RATE

\[ E_{(t)} = E_{(t-1)} \cdot (1 + CPIT_{(t-1)} - CPIT_{IC_{(t-1)}}) \]
REFERENCES OF ANNEX A


Artus P. and P.A. Muet P.A., [1990], Investment and Factor Demand, North Holland.


Rama M., [1993], "Empirical Investment Equations for Developing Countries" in Solimano A. and Serven L. (editors), Chapter 5, pp.107-143


ANNEX B

INVESTMENT IN SOUTH AFRICAN MANUFACTURING INDUSTRY, 1972-90
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ANNEX B: INVESTMENT IN SOUTH AFRICAN MANUFACTURING INDUSTRY, 1972-90

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Annex B

Investment in South African Manufacturing Industry, 1972-90

Investment in South Africa has been at least comparable to other countries at its income level, relative to output and to the existing capital stock. Yet the economy has declined. The manufacturing sector, is no exception. A closer look shows that both the composition of investment as well as its pattern, are important in understanding the sector’s performance. While public investment has become increasingly important, the sector has a poor record in terms of capital productivity. Recent research suggests that private investment is more directly linked to growth than is public sector investment (Khan and Reinhart (1990)). Future growth will require higher private investment (which is capacity-increasing) accompanied by an improvement in efficiency.

This paper seeks to identify the main factors underlying the pattern of capital accumulation in South African manufacturing from 1972 to 1990. The paper is organized in two sections. The first, presents the salient characteristics and trends in manufacturing investment since 1972 at both the aggregate and sub-sectoral level. The second discusses the theoretical determinants of investment and the behavior of domestic demand, the cost of capital, and macroeconomic variables.

The paper finds that manufacturing investment has reflected the goals of reducing external dependence, and has been dominated by investment in the public sectors. This investment was concentrated in areas perceived to be South Africa’s base of comparative advantage, namely its natural resource-based industries. The overall distribution of capital is concentrated and does not appear to have changed significantly in the past twenty years. Fiscal incentives were designed to support this policy. There are signs, however, of movement towards a more neutral tax regime in recent years. Given that the overall level of private investment as well as its intersectoral allocation are sensitive to relative factor prices, this is a step in the right direction. Since uncertainty in the form of macroeconomic or political instability could derail any recovery in investment and growth, the credibility and sustainability of reforms will be critical.
1. Stylized Features of the Manufacturing Sector in South Africa

The manufacturing sector in South Africa was traditionally an important engine of growth. Over the past decade, however, the sector has been in stagnation and decline. This is due partly to the increasing importance of large state-directed "strategic" investments. In addition, the rate of capital accumulation was highest in minerals-related (and more broadly, natural-resource-based subsectors) which tended to be least productive, contributing to the decline in manufacturing output. The industrial incentive framework, particularly the set of fiscal incentives, encouraged a less than efficient allocation of capital. Given the highly capital-intensive nature of natural resource-based investments, the sector as a whole has become more capital-intensive. Finally, there appears to be little structural change in manufacturing. On the contrary, capital stock in the sector has increased in concentration in response to selective and discretionary incentives. To summarize, the manufacturing sector can be characterized by the following stylized features:

- Declining output growth
- Falling investment
- Increased importance of public investment
- Dominance of natural-resource based investments
- Deteriorating productivity
- Uneven incentives

Declining Growth

The development of manufacturing in South Africa reflects the import-substitution strategy it followed up to the early seventies, and the structural transformation typically observed by countries during the growth process. Production progressed from non-durable consumer goods to durable consumer goods, before advancing to more highly processed and sophisticated intermediate and capital goods. From 1946 to 1970, manufacturing grew at an annual average rate of 6.9 percent and was the leading sector of growth for the economy, which grew at 4.9 percent. While manufacturing growth
slowed between 1970 and 1981, it still grew faster than other sectors of the economy. Thus, manufacturing became increasingly important as a share of GDP, rising from 15 percent in 1960 to 24 percent by 1981. Since 1981, however, the sector has stagnated; its output, employment and rate of capital accumulation have all been low relative to historic levels, and capital stock actually shrunk between 1983 and 1988. The decline in the sector (about 2.6 percent annually) between 1981 and 1986 was a major reason for the overall decline in the South African economy over the period. Despite a recovery in investment after 1986, manufacturing growth is still anemic (at 2.2 percent since 1986), and the sector contributed only 20 percent to GDP in 1990.

**Investment Behavior**

**Trends.** The overall trend in manufacturing investment while demand-driven, has been strongly influenced by strategic considerations and exogenous shocks. Capital stock growth was buoyant in most manufacturing industries in the seventies. The boom in gold and other commodity prices, generous tax incentives, and low (sometimes negative) real interest rates encouraged investment. Exceptionally high investment rates were recorded in the first half of the seventies in iron and steel because of construction of new steelworks by ISCOR.\(^1\) In the second half of the seventies, accelerated investment was primarily a result of massive investments in chemicals and sustained investment in iron and steel; most other sub-sectors exhibit a slow-down in investment. Much of the apparent collapse in overall investment from 1982-86 is due to the cessation of large minerals-related investments in two key sub-sectors: chemicals and iron and steel (which was not offset despite large investments in the paper subsector). Once these are removed from the total, the peaks and troughs are less pronounced (see Figure B.1). Reasons for the decline include, external shocks (adverse terms of trade movements and slowdown in world trade),

---

\(^1\) ISCOR is the Iron and Steel Corporation (public). It has continued to expand its capacity exponentially over the years. Expansion in the steelworks in Pretoria and Vanderbijlpark took place in 1973. A third steel plant in Newcastle was completed in 1974.
Figure B.1: Gross Fixed Investment
(millions of 1990 rand)

---

continued increase in wages, and the effect of financial sanctions on South Africa. The latter part of the eighties saw continued (and broader) decline in investment as political and economic uncertainty increased. This pattern was repeated across most of the sub-sectors in manufacturing.\(^2\) Thus, capital accumulation was sluggish during the eighties, averaging -0.2 percent from 1984-90.

---

2 One important exception to the generalized pattern of decline is the "other manufacturing" category, a catch-all for strategic products such as arms. The state-owned Armaments Development Corporation (ARMSCOR) was established in 1967 in response to the embargo by the industrialized world on arms exports to South Africa. While production figures are difficult to obtain, it is clear that the manufacture and repair of armaments has increased in South Africa - the country is now a net exporter of armaments. Most of this activity is subsumed in the "other manufacturing" category. See also Jones and Muller (1992).
Source of growth decline. Movements in the rate of capital accumulation (and hence investment rate) provide a partial explanation of the declining manufacturing output growth. However, given that significant divergences in the two growth rates occurred over the period, investment trends cannot provide the entire explanation. Figure B.2 presents five-year moving average annual growth rates for capital stock and output in manufacturing. Up to the early seventies, both capital and output grew at similar rates, resulting in a steady capital-output ratio. Starting in 1973, there was increasingly greater divergence between the two growth rates. While both capital and output declined, the rate of growth of capital stock declined by less than that of output, resulting in a rising capital-output ratio.

**Figure B.2: Average Annual Growth Rates in Manufacturing**
(5-year moving average (percent))
Between 1983 and 1987, the ratio increased by 64 percent. While this divergence narrowed between 1978-80 and 1987-88 because of the boom in gold prices, it was still remarkable. Between 1986 and 1989, output actually increased despite continued decline in capital accumulation. So it is necessary to turn to other explanations.

One explanation for the decline in manufacturing's performance is the change in the composition of manufacturing investment over time (the relative shares of private versus public ownership). Investment in the public sector has become more important relative to private, and given the lower productivity of the former, this probably contributed to lower growth than would otherwise have been the case. A second explanation is that at the sub-sectoral level, investment appears to have been channelled to low productivity areas. The heavily directed incentive framework appears to be a primary factor in the allocative inefficiencies which have occurred. As a result of these changes in both the composition and pattern of investment, the allocation of capital in manufacturing has become increasingly concentrated, and the sector has seen a significant increase in capital-intensity.

The composition of investment: the public/private divide

Public and private investment in South Africa followed relatively similar paths up to the early sixties. Subsequent movements, however, show how the underlying determinants of the two components differ. Public sector investment in South Africa is a policy variable which has been determined primarily by terms of trade movements and strategic import-replacing considerations. Private investment shows clear signs of responding to market conditions such as domestic demand and changes in relative factor prices.

Investment in manufacturing was historically dominated by the private sector. With the establishment of apartheid, increasing international opprobrium, and reduced investor confidence, however, government-directed strategic investments became a more important part of the industrial strategy, adding importance to public investment. From 1960-80, public investment in manufacturing
increased at more than double the rate of private investment in the sector (see Table B.1). Over that period private investment grew at an annual rate of only 6 percent as against 15.6 percent for public investment. By 1980, public investment accounted for almost 50 percent of total investment in manufacturing. The most pronounced increase in public investment occurred between 1972 and 1980 - more than four times faster than private investment in the manufacturing sector. This rise undoubtedly reflects the lumpy investments associated with SASOL Two and SASOL Three aimed at reducing South African dependency on external fuel sources. The early part of the eighties saw a collapse in investment caused by deteriorating terms of trade, domestic recession, and imposition of financial sanctions. The public investment component started declining earlier, in response to the drop in world gold prices, and was slower to recover. The decline in public sector investment was, nonetheless, smaller than the drop in private investment. Between 1981-86, private and public investment fell by 22 percent and 7 percent respectively. After 1987, investment recovered across the board. This was driven partly by large public sector investments such as MOSSGAS (1987).

Table B.1: Trends in Private and Public Investment in Manufacturing (1990 prices)

<table>
<thead>
<tr>
<th>Period</th>
<th>Annual Growth Rates</th>
<th>Public Investment/ Total Investment percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-90</td>
<td>4.2%</td>
<td>6.4%</td>
</tr>
<tr>
<td>1960-80</td>
<td>6.0%</td>
<td>15.6%</td>
</tr>
<tr>
<td>1972-80</td>
<td>2.9%</td>
<td>12.2%</td>
</tr>
<tr>
<td>1972-76</td>
<td>3.2%</td>
<td>0.9%</td>
</tr>
<tr>
<td>1977-81</td>
<td>13.9%</td>
<td>14.6%</td>
</tr>
<tr>
<td>1982-86</td>
<td>-22.4%</td>
<td>-7.5%</td>
</tr>
<tr>
<td>1986-90</td>
<td>18.9%</td>
<td>19.8%</td>
</tr>
</tbody>
</table>

Source: CSS

---

3 SASOL (Suid-Afrikaanse Steenkool-Olie-en Gaskorporasie) is a public corporation. SASOL Two (started in 1974 and completed in 1980 for R4 bn) and SASOL Three (begun in 1979 and completed in 1983 at R6 bn) built two new oil-from-coal plants. See Eberhard and Trollip (1992), and Jones and Muller (1992).
The changing composition of investment has had serious implications for the productivity of the sector. Increased reliance on large public-sector investments contributed to declining productivity. While capital-output ratios cannot be calculated according to ownership (public/private), the size of the public investments made, and an identification of sub-sectors dominated by the public sector—such as iron and steel, and industrial chemicals—give the sense that the overall productivity decline is driven by poor performance of public investments.

Mineral-related investments and deteriorating productivity

While many of the largest investments have been made by the public sector, a broader issue is that most new investments in manufacturing have been minerals-related, and more generally, natural resource-based. While these are areas of comparative advantage, an examination of the fiscal incentive framework shows a deliberate policy to encourage and direct investment into what were considered critical strategic areas.

The implications of the resulting pattern of capital accumulation for manufacturing output and employment are most clearly shown by an examination of capital productivity across subsectors. Two subsectors which have accounted for the greatest increase in capital accumulation (basic iron and steel and chemicals) have tended to be among the worst performers in productivity. In most sub-periods these subsectors are three or four times less productive than the others. Clearly, these strategic investments were achieved at a cost in output and employment.

The dominance of the natural-resource based subsectors, particularly the mineral-related ones is highlighted by Table B.2. The table presents capital-output ratios for two groups of industries:

- mineral-related: defined as base metals and industrial chemicals
- natural-resource-based: defined as mineral-related and paper and paper products.
In both the rest of manufacturing is defined as the non-mineral based and non-natural resource-based subsectors, respectively. In each case, other manufacturing shows a distinctly higher capital productivity – sometimes six times as high. Given the predominance of investment in the natural-resource sectors, their low productivity is very disturbing. In the three sectors which account for two-thirds of investment (iron and steel, chemicals, and food and beverages), the capital-output ratio is about three times as high as the rest of manufacturing. Even though a slight improvement in productivity performance has occurred in the natural-resource-based industries, there is no marked improvement for the manufacturing sector as a whole. And while productivity of the non-resource-based industries is high relative to the natural-resource-based industries, it has declined over time. Resources may have been misallocated in the seventies and eighties, in the sense that the least productive subsectors received the most investment. A simple correlation between total factor productivity growth and the initial stock of capital generated a strong negative Spearman's rank correlation.

Table B.2: Capital-Output Ratios

<table>
<thead>
<tr>
<th></th>
<th>72-90</th>
<th>72-76</th>
<th>77-81</th>
<th>82-86</th>
<th>87-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral-related</td>
<td>1.20</td>
<td>1.39</td>
<td>1.21</td>
<td>1.12</td>
<td>1.04</td>
</tr>
<tr>
<td>Non-mineral related</td>
<td>0.18</td>
<td>0.16</td>
<td>0.15</td>
<td>0.21</td>
<td>0.20</td>
</tr>
<tr>
<td>Natural-resource</td>
<td>1.09</td>
<td>1.22</td>
<td>1.11</td>
<td>1.05</td>
<td>0.99</td>
</tr>
<tr>
<td>Non-natural resource</td>
<td>0.18</td>
<td>0.16</td>
<td>0.17</td>
<td>0.25</td>
<td>0.20</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.45</td>
<td>0.36</td>
<td>0.43</td>
<td>0.54</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Source: IDC database, staff calculations

Note: 1. Ratios are capital to gross output
Apart from "economic" strategic reasons, there is evidence that augmentation of white employment was also an important consideration in the channelling of resources to particular sectors. Levy (1992) has argued that state-directed investment was heavily channelled to the most capital-intensive sectors where white workers were concentrated.

Factors pertaining to the labor market

In addition to channelling investment to low-productivity and capital-intensive subsectors, it is likely that labor market factors also contributed to the decline in productivity. Low and even negative real interest rates, rising black wages, and increased labor unrest all contributed to some substitution of capital away from labor. Figure B.3 shows the increased capital-intensity in manufacturing as the cost of capital fell relative to labor. Between 1972 and 1985 capital intensity (as measured by the capital-labor ratio) almost doubled. After 1985, the trend was reversed. Probable reasons include stagnating black wages, the increased cost of capital due to exchange rate depreciation and tax reforms, and the completion of many "strategic" investments. Fallon (1992) has shown that both demand for capital and black labor are sensitive to relative factor prices at the aggregate level. This relationship is likely to hold for the manufacturing sector.

In addition to the increase in capital-intensity over time driven by large state-directed and highly capital-intensive investments, a corollary of this strategy is a highly concentrated distribution of capital stock.

Concentration of capital stock

An examination of the existing capital stock structure indicates which industries have been the most attractive areas for investing in South Africa over the past two decades and reflects the importance of "strategic" investments in industrial strategy. The most striking feature of the current composition of the capital stock is the extremely high concentration of capital stock. Three sub-sectors (food, beverages
and tobacco, chemicals, and basic iron and steel) accounted for more than two-thirds of manufacturing capital stock in 1990. The magnitude of concentration has also increased over the past two decades; in 1972, the (same) three industries accounted for just over half of the total capital stock in manufacturing. Up to 1976, an increasing share of investment went into iron and steel in response to the need to upgrade

**Figure B.3: Capital-Labor Ratios and Relative Factor Prices**

(1980 = 100)

Within the iron and steel industry itself, there is high concentration: a small number of firms control the bulk of the capital stock.
and modernize the existing capital stock. After 1976, the chemicals industry rapidly became dominant - going from 11 percent of the total capital stock in 1976 to 34 percent by 1982. These investments associated with SASOL Two and SASOL Three were intended to insulate South Africa from rising fuel prices and threatened oil embargoes respectively. The clothing, textiles, footwear and wood products industries, by contrast, have seen a secular decline in their share of the sector's total capital stock.
A more formal evaluation of the change in concentration in manufacturing was carried out using the Herfindahl Index (HI)\(^5\) pictured in Figure B.4. It shows an increased concentration of capital from 1972-81. This was due both to the development of the chemicals industry, and the fall in the rate of capital accumulation in declining industries such as textiles. Between 1981 and 1985, capital was more evenly distributed as the investment program in chemicals was completed. Since 1985, capital has once again become more concentrated, though less so than at its peak in 1981.

Uneven incentives

The less than efficient allocation of resources can be linked to the directed, and hence uneven, incentives given to different sub-sectors. These operated primarily through the fiscal incentives given to firms. Over the years, South Africa has employed a wide range of tax incentives intended to boost investment, and to achieve industry-specific, regional, decentralization, and export promotion goals. These schemes are notable for their proliferation and the selectivity which they introduce. An examination of the fiscal incentives offered to firms shows significant disparities across firms. While this disparity has narrowed over time, particularly in the past three years, it still exists. A look at trends in the real user cost of capital across sub-groups illustrates these points. It is significantly lower for natural-resource based industries until the late eighties. However, there is reason for cautious optimism. First, the evidence suggests that the divergence in user costs of capital has narrowed in recent years, implying a more neutral incentive framework. Second private investment does appear to respond to the user cost of capital and other market variables. Thus under a stable macroeconomic situation and lower corporate tax rate, it can be expected that investment will respond positively. Finally, it appears that inter-sectoral investment is responsive to the different user costs of capital across sectors. Under a more neutral incentive scheme, allocative efficiency should improve as resources are re-allocated.

\[ \text{The Herfindahl Index (HI) = } \sum(\text{sqr}(k_i/k_m)) \text{ where } k_i \text{ is the capital stock in subsector 'i' at time 't', } k_m \text{ is the capital stock in the manufacturing sector at time 't'. An increase in the index indicates an increasing concentration of capital in the manufacturing sector. 27 subsectors were used in this calculation.} \]
2. Determinants of Manufacturing Investment

A rapidly growing literature exists on both the theoretical and empirical determinants of private investment. These studies find that private investment is related positively to the change in output, negatively to the deviation of output from its trend value, and negatively to the cost of funds and macroeconomic instability.

Demand and supply factors, as well as political uncertainty, have been important in the determination of private investment in manufacturing in South Africa. Generally, demand is the most important factor. On the supply side, the user cost of capital is also a major factor. Over the years, South Africa has employed a variety of tax incentives in the form of fiscal incentives and accelerated depreciation to promote a plethora of investment goals, and to achieve greater output growth. The tax regime changed frequently and the existence of the generous incentives significantly offset the high rate of corporate taxation. In this section we examine the behavior of the underlying determinants of investment – primarily domestic demand and the tax regime.

Findings: Industrial incentives essentially reflected the industrial policy of "strategic" investments aimed at reducing South Africa's external dependence. Not surprisingly, the fastest rates of capital accumulation have mainly been in natural-resource-based industries closely linked with the mining sector, and which faced the lowest user costs of capital. Many of these industries are dominated by large capital-intensive public sector firms, which helps to explain the increasing concentration of capital that has occurred. Our analysis indicates that the discretionary and selective nature of tax incentives has resulted in tremendous variation among sub-sectors and prevented the free allocation of capital. The magnitude of tax incentives has produced large net capital subsidy rates. In recent years, an effort has been made to reduce the generous fiscal incentives to industry and this has contributed to higher user costs of capital.

6 See Blejer and Khan (1984), Greene and Villanueva (1990), Tun Wai and Wong (1982) for developing countries, and Jorgenson (1970), Clark (1979) for developed countries. Severn and Solimano (1989) provide a comprehensive review of both the analytical and empirical issues in the determination of private investment in developing countries.
Both the overall investment and the intersectoral allocation of investment appear sensitive to the cost of capital. Finally, while hard to quantify, increasing political uncertainty in the form of labor unrest, consumer boycotts, and strikes, appear to have contributed to declining investor confidence.

Demand side factors

In general, aggregate demand can be expected to be closely linked with investment. All other things being equal, high aggregate demand, gives investors confidence, causing to them to invest in additional capacity if they expect the boom to persist. In South Africa, the link between demand and investment is accentuated because of traditional inward-orientation. Even a cursory examination of capacity utilization and investment rates in manufacturing suggests that this relationship holds (Figure B.5). In general, periods of high capacity utilization are associated with high investment rates and vice-versa.
### Table B.3: Capacity Utilization: Levels and Annual Average Change (percent)

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Levels</th>
<th>Annual Average Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Manufacturing</td>
<td>87.50</td>
<td>89.90</td>
</tr>
<tr>
<td>Food, Beverages &amp; Tobacco</td>
<td>86.54</td>
<td>86.64</td>
</tr>
<tr>
<td>Textiles</td>
<td>86.50</td>
<td>91.60</td>
</tr>
<tr>
<td>Clothing, Leather &amp; Footwear</td>
<td>91.28</td>
<td>93.79</td>
</tr>
<tr>
<td>Wood and Furniture</td>
<td>86.95</td>
<td>93.62</td>
</tr>
<tr>
<td>Paper and Paper Products</td>
<td>91.40</td>
<td>94.50</td>
</tr>
<tr>
<td>Industrial Chemicals*</td>
<td>91.80</td>
<td>93.70</td>
</tr>
<tr>
<td>Other Chemicals</td>
<td>84.60</td>
<td>86.80</td>
</tr>
<tr>
<td>Rubber and Plastic</td>
<td>89.73</td>
<td>89.87</td>
</tr>
<tr>
<td>Non-Metallic Products</td>
<td>89.70</td>
<td>92.74</td>
</tr>
<tr>
<td>Basic Iron &amp; Steel</td>
<td>92.20</td>
<td>91.40</td>
</tr>
<tr>
<td>Basic Non-Ferrous</td>
<td>85.70</td>
<td>89.80</td>
</tr>
<tr>
<td>Metal Products &amp; Machinery</td>
<td>86.48</td>
<td>88.27</td>
</tr>
<tr>
<td>Transport Equipment</td>
<td>81.51</td>
<td>89.10</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>89.10</td>
<td>90.81</td>
</tr>
</tbody>
</table>

Source: IDC, staff calculations

Manufacturing output has declined since 1981. With capital continuing to grow until 1984, the mini-recession was reflected in high levels of excess capacity in manufacturing. Between 1981 and 1986, capacity utilization fell sharply. Even the subsequent recovery has resulted in capacity utilization low by historical standards. The behavior of capacity utilization is broadly similar across subsectors over time; the exceptions are the natural resource sectors which experienced more pronounced booms and troughs, perhaps reflecting the huge investments made in the seventies in anticipation of increased external demand which did not materialize. In the basic iron and steel industry, expansion of capacity coincided with...
falling world demand and a consequent glut in the mid-seventies. Table B.3 presents the average change in capacity utilization rates for different industries in manufacturing for three sub-periods. Between 1972 and 1981, capacity utilization, while varying, increased in almost all industries (except iron and steel). This pattern emerged during 1981-86, which saw substantially lower rates of capacity utilization in all sectors. The largest declines occurred in non-metallic products, industrial chemicals, metal products, and other transport equipment. Since 1986, all sectors except industrial chemicals have experienced improved capacity utilization.

Supply side factors

These influence investment primarily through the cost of capital and expected profitability. Important factors include the lending rate, the rate of inflation, and the tax regime.

Real user cost of capital \( (q) \). The real user cost of capital is the cost, inclusive of taxes, of using (in this case) a rand's worth of capital for one period. It is derived from the firm's profit-maximization problem. Formally, following Schankerman (1993) it is derived from the following equilibrium condition:

\[
P_k = \int e^{-\delta t} \left[ ((1-u)qP_y e^{\delta t} + u(1-\theta)P_z) dt + (T + \theta)P_k \right]
\]

\( P_k \) is the price of investment goods, \( P_y \) is the price of output (represented by the GDP deflator), \( \delta \) is the rate of (economic) depreciation, \( \rho \) is the nominal discount rate, \( \pi \) is the rate of inflation, \( u \) is the corporate tax rate, \( \theta \), \( \tau \), and \( z \) are the initial, investment and present value of depreciation (wear and tear) allowances respectively. The first term in the square brackets represents the after-tax marginal revenue product of the capital investment in each period, while the second is the effective present-value tax shield resulting from depreciation allowances. These net returns are cumulated at the firm's real rate of discount. The third and last term in (1) is the tax savings due to the investment and initial allowances.

---

7 The export facilities had a capacity of 18 million tonnes of iron ore, but in many years less than half this amount was exported.
The real user cost of capital \( (q) \) is solved from the equilibrium condition in (1) as follows:

\[
(2) \quad q = \frac{P_y}{P_x} (\rho - \pi + \delta) \left[ (1 - \tau) (1 - uz) - uz \right] / (1 - u)
\]

The derived user cost of capital \( (q) \) is a function of many variables, including: inflation (both actual and expected), the economic depreciation of the asset and the tax treatment of that depreciation, the corporate tax regime, any fiscal incentives, and the cost of debt finance. The user cost of capital simply denotes the minimum net rate of return required on real assets. The first part of the formula in brackets on the right-hand side represents the real required rate of return on the investment less depreciation. The second part in square brackets represents the tax effect. In a world with no taxes, the nominal discount rate of the firm equals the interest rate. In the presence of taxes, the firm's discount rate becomes a function of tax parameters, the interest rate, and the method by which an investment is financed.

**Tax concessions.** Over the years, South Africa has employed a wide range of tax incentives intended to boost investment, and to achieve industry-specific, regional, decentralization, and export promotion goals.\(^8\) An important element of selectivity exists in some of the incentives. The promotion of "beneficiation" through Section 37(E) of the Income Tax Act whereby machinery, plant and buildings used in beneficiation enjoy enhanced depreciation and immediate deduction of any pre-production interest on that cost is an example.\(^9\) (Clearly, to the extent that the estimated user cost of capital does not incorporate the forward interest cover, or incentives to producers of steel, the cost of capital is

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\(^8\) The Margo Commission Report (1987) describes the main features of the different tax incentives.

\(^9\) Non-tax incentives include: the General Export Incentive Scheme (GEIS), special low interest rates for exports offered by the Industrial Development Corporation; both support exports. Development programs exist for specific industries such as the Phase VI local content programme for motor vehicles, "innovation support" for the electronic industry, and duty-free imports of inputs (yarns, fabrics, and clothing) in the textile, apparel and clothing industry.

\(^10\) Department of Trade and Industry, 1991. Qualification for the scheme was achieved through committee evaluation of applications and was based, theoretically, on an assessment of the process' contribution in value-added and export growth. The process was required to "be on a large scale and be internationally competitive". There are plans to discontinue 37(E): the March 1993 budget did not announce any new 37(E) projects.
underestimated. Even so, the failure to incorporate the capital surcharge is likely to offset this to some extent. Thus, the existence of both discretionary implementation and selectivity introduces a distortionary element in capital allocation across sectors. A change (narrowing) has occurred over time in both the magnitude and range of these allowances, particularly from the mid-eighties onwards, which is reflected in the overall cost of capital.

Before 1980, the user cost for the manufacturing sector as a whole fluctuated widely. Since 1983, it has shown an upward trend with declines in 1987 and 1988. Part of the explanation of the upward trend after 1983 lies in the fact that a large portion of capital goods in South Africa is imported. The sharp depreciation in 1983 raised (with a year’s lag) the price of capital goods used as a deflator in the derivation of the user cost. In addition, the move from low and negative to positive real interest rates contributed to the increased user cost. While there was a very slight upward trend in the cost of capital during the eighties, a concurrent increase in wages meant that by the end of the period relative factor prices were essentially the same as at the beginning. (see Figure B.6). In general, because financial policy (and hence the borrowing structure) is assumed constant across firms and because all firms face the same corporate tax rate, differences in the user cost of capital across manufacturing sub-sectors in South Africa are primarily driven by the rates of depreciation for capital in the different sub-sectors, the composition of investment, as well as the magnitude of aggregate tax concessions.

The immediate expectation is that a higher user cost of capital will be associated with lower investment, and vice versa. In South Africa, this relationship held between 1975 and 1990, particularly after 1978 (see Figure B.7). Simple correlations between investment and the change in the cost of capital for sub-periods between 1975 and 1990 ranged from -0.66 to -0.8, with higher correlations being associated with later sub-periods. It is not surprising that it did not hold as strongly in earlier years since investment was then more policy-driven than market-driven. The inter-sectoral allocation of investment is also sensitive to intersectoral differences in the cost of capital.

In addition to the fluctuations in the overall cost of capital over time, significant variation has occurred in the cost of capital for different sub-sectors. Table B.4 presents the user cost of capital for
individual industries, as well as the change in their investment cost in relation to the other industries.\textsuperscript{11} Four main points can be made. First, even at the relatively aggregated level of fourteen sub-sectors there is tremendous variation across industries, ranging from 2 percent for the food and beverages subsectors, to 11 percent for textiles.\textsuperscript{12} Second, the real user cost is higher post-1983, increasing in every industry and fewer tax credits as investment except basic iron and steel, reflecting higher real (and expected real) lending rates, higher corporate taxes, allowances were phased-out and initial allowances reduced at the end of the period. Third, the user cost of capital is lowest in paper, non-ferrous metals, iron and steel, non-metallic products, and chemicals, all of which are dominated by large resource-based public sector firms (ISCOR, SASOL) or have had a special program in the past (paper through SAPPI). (It is highest in textiles, wood, clothing, other transport equipment, rubber, and metal products). Fourth, the relative rankings in both time periods establish that very little change has taken place in the relative industrial incentive structure as measured by the tax regime.

The user cost of capital rankings have remained steady. This implies that differences in incentives have also remained stable despite the trend towards more market-driven incentives. There are a few exceptions. The user cost of capital fell in iron and steel relative to the rest of the manufacturing industries because its user cost stayed constant while every other subsector saw an increase. Non-metallic products also improved their relative ranking. In textiles, the user cost of capital increased relative to the rest of the sector (but this was probably offset by other incentives enjoyed by the industry through high protection and the Structural Adjustment Programme (SAP)). There are indications that changes in the tax regime since 1990 (the last year for which accelerated depreciation write-offs were in place and for which the user cost was calculated) have since increased the cost of capital.

\textsuperscript{11} This real user cost of capital was developed and constructed by M. Schankerman.

\textsuperscript{12} Some of this variation is of course explained by differences in asset lives across subsectors.
Figure B.6: Relative Factor Prices

Figure B.7: Investment and the Cost of Capital
The real user cost of capital has fluctuated significantly over the period under review. This pattern is repeated across subsectors, albeit in a differential manner. But despite the rapidly increasing cost of capital faced by the paper, industrial chemicals and non-ferrous metals subsectors after 1982, they still have a very low user cost of capital relative to other subsectors (see Tables B.4 and B.5). The slowest rate of increases in the cost of capital were experienced by the iron and steel, metal products and machinery, and non-metallic products subsectors.

The inter-industry variation in both the level and growth of the user cost of capital is troubling. In a sophisticated and competitive capital market (such as South Africa’s), one would expect firms to have roughly equal access to finance; all firms face the same corporate tax rate and concessions are presumed to be available to all firms. The difference in the rate of change of the user cost of capital across subsectors implies that tax incentives have been uneven over time. The estimated variation is additionally compounded by non-uniform regional, industry-specific, as well as export incentives. Such variation reduces allocative efficiency by changing the relative attractiveness of subsectors for investment (unless perhaps these counteract other incentives). It can lead to revenue loss as activities shift to low-tax subsectors. In addition, the variation increases administrative complexity.

Simulations

To sharpen the analysis of the effects on the user cost of capital, simulations were carried out, varying values of the key parameters. Figures B.8a to B.8e present the results of various simulations to further assess the relative importance of different components of the tax regime. In Figure B.8a, the corporate tax rate is allowed to stay at its 1972 level of 42 percent. The results indicate that the corporate tax rate does not appear to have caused an excessively high user cost of capital over most of the period. In fact, only from 1985 to 1987 did the corporate income tax have an appreciable impact on the user cost of capital (though by less than half a percentage point).
Table B.4: Real User Cost of Capital (percent)

<table>
<thead>
<tr>
<th>Sector</th>
<th>1972-83</th>
<th>1984-90</th>
<th>1972-90</th>
<th>Change in rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Manufacturing</td>
<td>5.6</td>
<td>7.1</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>Food, Beverages and Tobacco</td>
<td>5.6 (9)</td>
<td>7.0 (7)</td>
<td>2.0</td>
<td>(2)</td>
</tr>
<tr>
<td>Textiles</td>
<td>9.7 (14)</td>
<td>14.0 (14)</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Clothing, Leather and Footwear</td>
<td>5.4 (8)</td>
<td>9.2 (12)</td>
<td>6.8</td>
<td>4</td>
</tr>
<tr>
<td>Wood and Furniture</td>
<td>7.4 (13)</td>
<td>11.0 (13)</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>Paper and Paper Products</td>
<td>3.6 (1)</td>
<td>5.2 (1)</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Industrial Chemicals</td>
<td>4.7 (4)</td>
<td>6.5 (5)</td>
<td>5.4</td>
<td>1</td>
</tr>
<tr>
<td>Other Chemicals</td>
<td>4.9 (5)</td>
<td>6.6 (6)</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Rubber and Plastic</td>
<td>4.9 (5)</td>
<td>8.5 (9)</td>
<td>6.2</td>
<td>3</td>
</tr>
<tr>
<td>Non-Metallic Products</td>
<td>5.0 (7)</td>
<td>6.4 (4)</td>
<td>5.5</td>
<td>(3)</td>
</tr>
<tr>
<td>Basic Iron and Steel</td>
<td>5.7 (10)</td>
<td>5.7 (3)</td>
<td>5.7</td>
<td>(7)</td>
</tr>
<tr>
<td>Basic Non-Ferrous Metals</td>
<td>3.8 (2)</td>
<td>5.5 (2)</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Metal Products and Machinery</td>
<td>6.2 (11)</td>
<td>8.8 (10)</td>
<td>7.2</td>
<td>(1)</td>
</tr>
<tr>
<td>Transport Equipment</td>
<td>6.6 (12)</td>
<td>9.0 (11)</td>
<td>7.5</td>
<td>(1)</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>4.5 (3)</td>
<td>7.5 (8)</td>
<td>5.6</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: M. Schankerman, Bank staff estimates.

Notes: 1. In the first two columns the rank in ascending order is given in parentheses ( ).
2. In the last column, the number gives the fall ( ) or rise in the ranking of the sector, while " " indicates no change.
Table B.5: Average Annual Growth Rates in the User Cost of Capital  
(percent)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Manufacturing</td>
<td>-15.4</td>
<td>1.0</td>
<td>21.8</td>
<td>-4.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Food, Beverages and Tobacco</td>
<td>-12.1</td>
<td>3.1</td>
<td>17.0</td>
<td>-6.8</td>
<td>1.4</td>
</tr>
<tr>
<td>Textiles</td>
<td>-6.5</td>
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<td>-3.3</td>
<td>4.2</td>
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<td>23.3</td>
<td>-2.3</td>
<td>2.9</td>
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Source: Schankerman (1993), Bank staff estimates.
Figure B.8a: Holding the corporate tax rate constant

But the tax allowances have had an important impact on the effective tax rate and constitute a considerable subsidy to capital. While this has varied over time, it has remained sizable. Figures B.8b to B.8d present the hypothetical effects of removing individual tax allowances. In all three cases, the tax incentive contributes to lowering the effective tax rate, though the relative importance of each one changes over time. Up to 1984, the depreciation and investment allowances were most important in lowering the effective tax burden. With the phasing-out of the latter in 1984, initial allowances increased in importance until they were, in turn, phased-out in 1989. Figure B.8e shows the net effect of removing all tax incentives. Clearly, the various allowances have contributed to a huge subsidy on capital which has remained high over the period.
Figure B.8b: No depreciation allowance

Figure B.8c: No investment allowance
Subsidy implicit to capital in the tax regime. The capital subsidy rate (CSR) gives the value of tax incentives as a percentage of the cost of capital in the absence of tax incentives. Thus it is defined as:

\[ CSR = \frac{(q^* - q)}{q^*} \]

where \( q^* \) represents the user cost of capital in the absence of tax incentives, and \( q \) is the usual user cost of capital (including tax incentives). Thus in \( q^* \), the tax incentive parameters (\( z, \tau \), and \( \theta \)) are set equal to zero. The subsidy rate has declined over time reflecting the phasing-out of tax allowances. This occurred most noticeably after 1987.

Macroeconomic Variables

Inflation and interest rates. Interest rates were historically kept low in South Africa as the monetary authorities employed direct controls in the form of credit ceilings and liquid asset requirements. With nominal interest rates low and fixed, and inflationary pressures, real interest rates were low (and negative for extended periods) making borrowing less expensive. This encouraged capital-intensity in the South African economy. Starting in the mid-eighties, this trend was reversed because of stabilized inflation and an increase in nominal interest rates. Inflation stabilized in the 10 to 15 percent range in the eighties, after fluctuating considerably in the seventies as a result of terms of trade shocks. Since 1984, the expected real interest rate has been positive (Figure B.9).
Figure B.9: Nominal and Expected Real Interest Rates
(percent)

Figure B.10 shows the effect on the user cost of capital of maintaining a fixed real interest rate at 4 percent. The derived user cost follows the same trend showing that the user cost calculation initially is not particularly sensitive to the real interest rate. Only in the late seventies does the new assumption makes an appreciable difference in the user cost (raising it by about one percentage point).
Exchange Rate. The exchange rate affects investment through at least two channels. The first, which has traditionally been very important, is through its effect on the cost of foreign exchange.\textsuperscript{13} The import content of fixed investment is very high in South Africa: a depreciation of the rand can be expected to raise the price of capital -- as has indeed been the case (with a lag).\textsuperscript{14} This effect is reflected in the real user cost of capital. Nevertheless, there are other channels through which exchange rate movements can influence investment. One is through expected profitability; a depreciation would make exports more profitable in the future and increase investment. A second channel depends on the transmission mechanisms in the economy -- real wages and hence real incomes may be affected by a depreciation. The net effect of exchange rate movements depends on the relative impact of the different channels. In addition to the level of the exchange rate, the volatility of the exchange rate can be expected

\textsuperscript{13} Unlike other African countries, the availability of foreign exchange has not been an issue.

\textsuperscript{14} Despite an appreciation of the rand between 1986 and 1988 the price of capital increased as a result of the imposition of import surcharges.
to have a (negative) impact on investment in as much as it introduces risk and uncertainty to the investor's decision.

**Stability: macroeconomic and otherwise.** South Africa was characterized by a great deal of political and economic uncertainty in the period under review, particularly after 1985. Such uncertainty is usually a disincentive to invest because it introduces risk. Under the assumption that investors are risk-averse, disturbances of this nature tend to reduce investment since they increase the variance of expected profits. The tax regime, inflation earlier, exchange rate and improptu trade policy were all sources of uncertainty for firms in planning investment decisions. In particular, the level and volatility of some these determinants made it difficult for firms to assess future capital costs and wage bills. (For example, the mean rate of inflation measured by movements in the wholesale price index was about ten percent from 1972 to 1990.) While political uncertainty cannot be measured precisely, the occurrence of strikes, consumer boycotts, and labor unrest, and the imposition of sanctions in 1985, have collectively made investment less attractive. One indicator is the business confidence index put out by the South Africa Chamber of Business (SACOB). Trends in the index demonstrate increasing loss of confidence since 1988, and approaching the extremely low levels recorded in 1985-86 with the imposition of financial sanctions. Another indicator, the rand discount rate -- the percentage difference between the commercial and financial rand-- supports the notion of declining confidence.¹⁵

**Profitability.** Past profitability may be an important determinant of investment spending. It contributes to a firm's cash flow and gives an indication of future attractiveness of investing. Profitability in South African manufacturing (as measured by the ratio of gross operating surplus to capital stock) increased dramatically between 1985 and 1989, far exceeding historical rates. Possible explanations include increased concentration and increased monopoly power by firms in the sector as a result of disinvestment by foreign firms following sanctions. Evidence of concentration in the sector is scanty.¹⁶

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¹⁶ The existing work (Fourie and Smit (1989), Du Plessis (1978)) tends to equate Gini coefficients with concentration.
REFERENCES OF ANNEX B


ANNEX C

PRODUCTIVITY GROWTH IN SOUTH AFRICAN MANUFACTURING INDUSTRIES: 1972-1990
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**ANNEX C: PRODUCTIVITY GROWTH IN SOUTH AFRICAN MANUFACTURING INDUSTRIES: 1972-1990**

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1. Introduction

This paper examines the sources of growth in South African manufacturing industries from the production side between 1972 and 1990 by estimating the growth of total factor productivity (TFP) in 3 digit-level manufacturing industries. It draws four main conclusions. First, it finds that most output growth in manufacturing came from the increase in inputs rather than the growth in TFP. Second, comparing the performance of South African manufacturing with that of other countries, suggests that South Africa’s performance may be not as discouraging as is often claimed, especially in view of the extraordinary economic upheaval South Africa suffered in recent years. Third, what really ails South African manufacturing industries is overall stagnation caused by falling aggregate demand. Fourth, demand created by export expansion is more likely to lead to growth in TFP than demand created by import substitution.

2. Conceptual Measurement of Total Factor Productivity

Total factor productivity is measured as the residual after subtracting from the growth in output the growth attributable to increases in inputs.

Consider a constant return to scale production function with Hicks-neutral technological progress. Output, \( Y_n \), is a function of labor, \( L_n \), and capital, \( K_n \):

\[
(3) \quad Y_t = f(L_t, K_t)E_t
\]

\( E_t \) is the Hicks-neutral technical change. Following Solow(1957), taking the logarithmic time derivatives
of the presumed production function (3), equating the marginal product of labor to the real wage, and then applying the Euler's Theorem for linearly homogeneous functions, yields the Solow-residual

\[ \epsilon_t = \Delta y_t - \alpha_t \Delta l_t - \beta_t \Delta k_t , \]

where the \( \alpha_t \) and \( \beta_t \) are the shares of labor and capital income in nominal output, assuming that capital is also paid its marginal product, and the time derivative of a variable \( X_t \) is denoted as \( \Delta x_t \). Solow's residual is the percentage change of total factor productivity for any constant return to scale technology.  

One can see the relationship between the growth in labor productivity and that of TFP by rearranging (4). The growth rate of labor productivity can be expressed as:

\[ \Delta y_t - \Delta l_t = \beta_t (\Delta k_t - \Delta l_t) + \epsilon_t . \]

This equation states that output per head can grow either because capital per head increases or because TFP increases. Another way to look at this is to rewrite (5) as:

\[ \Delta y_t - \Delta l_t = \frac{1 - \alpha_t }{\alpha_t} (\Delta k_t - \Delta y_t (1) \epsilon_t . \]

The rate of growth of output per head depends positively on the growth rate of the capital-output ratio and on the growth rate of TFP. Labor productivity can grow as long as the growth rate of capital is greater than that of output, even if there is no growth in TFP. It can also grow without TFP growth as long as the growth rate of capital is greater than that of labor. It has been the experience of developed

---

1 Another way to measure TFP growth rate is to write,

\[ \epsilon_t = (\Delta y_t - \Delta k_t) - \alpha_t (\Delta l_t - \Delta k_t) \]

It is measured as the difference in the rate of growth of the output-capital ratio and the labor share weighted growth of labor to capital ratio. The only assumption required is that labor is paid its marginal product. This is the original formulation in Solow (1957).

2 No attempt has been made in this paper to distinguish the effect of resource reallocation on aggregate TFP growth. For an example, see Jorgenson, Gollop, and Fraumeni (1987).
countries that most labor-productivity growth has come from the growth of TFP. This contrasts with the experience of developing countries, where increased capital per head has accounted for most of the growth in labor productivity.³

It can be seen from (4) that the magnitude of the residual $\epsilon$, and its stability over time depend on: the form of the production function assumed; proper measurement of included inputs; and the importance of omitted input variables. Within an individual sector, the growth rate of TFP can be thought of as an index of the increase in productive capacity attributable to technical change, (the shift in the production frontier). It is generally regarded as a better measure of efficiency of input use⁴ than labor productivity.

Because the estimation of TFP growth assumes that firms are constantly in equilibrium, which seems unrealistic in the short-run when disequilibrium is apparent, some authors have attempted to adjust capital stock for capacity utilization. This approach is followed in this paper.

To weight the contribution of inputs to the growth of output, we need output elasticities for each inputs. Under the assumption that firms are in competitive equilibrium, it is standard practice to assume that factors are paid their marginal revenue products, and to use factor shares as output elasticities. But racial discrimination can violate this assumption. For example, if white labor had been paid more than its marginal product, and its wage premium declined over time, it will introduce upward bias in measured TFP growth. On the other hand, if wage discrimination against other groups has fallen over time, TFP growth will be under-estimated. The closing gap in racial wage differential is open to either interpretation, and its subsequent impact on the bias in the growth rate of TFP is unknown.

There are various ways to deal with the changes in factor shares over time. In principle, the

³ However, Jorgenson, Gollop, and Fraumeni (1987) and Jorgenson(1988) suggest that most labor productivity growth since the 1950s in the U.S.A. came from growth in inputs.

⁴ TFP growth of an aggregate economy, however, is not simply a weighted average of sector TFP growth. It may result from the reallocation of resources from less efficient sectors to more efficient ones. Therefore, the productivity growth of a country consists of reallocation of outputs and inputs, and sectoral productivity growth. TFP growth rate cannot show the absolute efficiency differences among sectors or countries because it is the residual out of a rate of change.
Divisia index of factor shares is the preferred choice. But because it tends to change substantially over time in South Africa, average factor shares were also used. But because the capital share in South African manufacturing sectors tends to increase over the period, by using average factor share, one might be overestimating the output elasticity of capital during the earlier years and, underestimating the capital-output elasticity during the later years. However, since this affects the weight assigned to labor in the opposite direction, the final direction of the bias introduced remains unclear.\(^5\)

3. Data Sources

Most data were provided by the Industrial Development Corporation (IDC) of South Africa. The exceptions are the capacity utilization index and weekly hours of work compiled by the Central Statistical Service (CSS).\(^6\) IDC has compiled industrial data by 3 and 4-digit SIC code classification, with a slight modification to the ISIC codes reflecting South Africa’s specific conditions. The IDC database includes information on gross output, value-added, employment, net capital stock, and factor income shares in nominal terms.

Output is measured as value-added gross of capital consumption in constant 1990 prices. This facilitates comparison with the "multi-factor" productivity growth estimates produced by the National Productivity Institute. Man-hours is obtained by multiplying the total number of employees from the IDC database with average hours worked, as calculated from data on normal and overtime hours published by the CSS. Annual average weekly hours of work is unavailable for the sub-period, 1972-81, except for the total manufacturing sector. Some sub-sectors do not have three-digit level data for the early 1980s. It is assumed that the number of hours-of work in the sub-sectors were the same as that of total manufacturing sector during 1972-1981, and that two-digit figures can be applied to three-digit sub-sectors

\(^5\) The value of output includes the value of production taxes such as excise taxes and other indirect taxes. Since the relevant data are unavailable, no adjustment for these taxes was made. The share of capital income out of value-added is gross operating surplus including depreciation and net interest payment before tax. Thus the share of capital is undoubtedly overestimated not only by the corporate income tax but also by business taxes, resulting in underestimation of TFP growth particularly because capital grew much more rapidly than labor.

\(^6\) The data on the average weekly hours by 3-digit industries were obtained by Mark Schankerman.
when only a broader classification is available. Capacity utilization rates are reported by the CSS throughout the period on a consistent basis. The sectoral capacity utilization indices tend to move together over time.

To calculate the TFP growth rates, we first use the trend growth rates of inputs and output, and average factor shares over the periods (since the yearly rates of change fluctuate widely between years). Later we also present Divisia TFP that reflects the changing factor shares.

4. Estimates of TFP Growth in South African Manufacturing

Between 1972 and 1981, output as measured by real value-added grew at 4.2 percent per year while capital grew more rapidly at 7.8 percent (Table C.1). During the second sub-period, growth in the manufacturing sector largely stalled with negative rates of input growth.

Table C.1: Input and Output Growth in Manufacturing

<table>
<thead>
<tr>
<th>Period</th>
<th>Capital</th>
<th>Labor</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972-1983</td>
<td>7.78</td>
<td>2.61</td>
<td>4.16</td>
</tr>
<tr>
<td>1983-1990</td>
<td>-1.30</td>
<td>-0.10</td>
<td>1.21</td>
</tr>
<tr>
<td>1972-1990</td>
<td>4.44</td>
<td>1.11</td>
<td>2.35</td>
</tr>
</tbody>
</table>

The numbers are compound growth rates from the antilog of the coefficient minus one from the regression of log \( X = a + bT \) where \( T \) is time trend variable.

Source: Staff Estimate
Table C.2: Contribution to Output Growth and Growth Rate of Labor Productivity

<table>
<thead>
<tr>
<th>Period</th>
<th>Output</th>
<th>Capital</th>
<th>Labor</th>
<th>TFP</th>
<th>Labor Productivity</th>
</tr>
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<tr>
<td>1972-1983</td>
<td>4.16</td>
<td>2.92</td>
<td>1.63</td>
<td>-0.39</td>
<td>1.51</td>
</tr>
<tr>
<td>1983-1990</td>
<td>1.21</td>
<td>-0.56</td>
<td>-0.06</td>
<td>1.83</td>
<td>1.32</td>
</tr>
<tr>
<td>1972-1990</td>
<td>2.35</td>
<td>1.76</td>
<td>0.67</td>
<td>-0.08</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Source: Staff Estimate

As shown in Table C.2, over 1972-1990 as a whole, output growth came entirely from increases in input use, especially in capital stock. There was virtually no growth in total factor productivity -- -0.1 percent per year. TFP growth for the first period is also negative, at an annual rate of -0.4 percent. Labor productivity growth shows a much steadier pattern: 1.5 percent and 1.3 percent, in each sub-period, and at 1.2 percent over the entire period.

Table C.3 presents the growth rates of TFP and labor productivity at the sectoral level. Basic iron and steel, and the basic non-ferrous metal industry had the highest growth rates in TFP, while the clothing, textile, and leather industries also had relatively TFP high growth.  

---

7 This may strike some people as inconsistent with the generally held view that the South African textile and clothing industry is particularly inefficient with high rate of protection and a large share of non-tariff barriers in South Africa falling into the sector. However, a higher growth rate of TFP of a sector does not imply a higher absolute efficiency, let alone international competitiveness.
Table C.3: Contribution to Output Growth in 3-Digit Level Industries

<table>
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<tr>
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<td>L</td>
<td>VA</td>
<td>K</td>
<td>L</td>
<td>VA</td>
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<td>Food</td>
<td>5.30</td>
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<td>1.66</td>
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<td>Textiles</td>
<td>1.63</td>
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<td>4.37</td>
<td>-1.52</td>
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<td>-0.44</td>
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<td>5.22</td>
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<td>3.07</td>
<td>0.97</td>
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<td>Footwear</td>
<td>1.59</td>
<td>2.18</td>
<td>2.81</td>
<td>-0.59</td>
<td>0.84</td>
<td>0.48</td>
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<td>Wood &amp; Wood Prod.</td>
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<td>5.24</td>
<td>-0.58</td>
<td>0.02</td>
<td>-1.06</td>
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<td>Furniture</td>
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<td>-3.71</td>
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<td>-2.10</td>
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<tr>
<td>Paper &amp; Paper Prod.</td>
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<td>1.33</td>
<td>2.62</td>
<td>-6.00</td>
<td>0.74</td>
<td>5.36</td>
</tr>
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<td>Printing &amp; Publishing</td>
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<td>1.61</td>
<td>2.62</td>
<td>-2.24</td>
<td>1.32</td>
<td>-0.60</td>
</tr>
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<td>Industrial Chemicals</td>
<td>21.57</td>
<td>5.60</td>
<td>4.98</td>
<td>-1.51</td>
<td>-0.80</td>
<td>2.89</td>
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<td>Other Chemicals</td>
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<td>Rubber</td>
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<td>0.95</td>
<td>1.81</td>
<td>-1.39</td>
<td>-1.29</td>
<td>-1.29</td>
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<td>Other Plastic</td>
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<td>3.39</td>
<td>3.39</td>
<td>3.39</td>
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<td>Pottery, China &amp; Earth</td>
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<td>-3.15</td>
<td>-2.03</td>
<td>1.57</td>
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<td>Basic Iron &amp; Steel</td>
<td>4.05</td>
<td>2.96</td>
<td>6.57</td>
<td>-1.55</td>
<td>1.60</td>
<td>2.46</td>
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<td>Basic Non-Ferrous</td>
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<td>7.36</td>
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<td>-1.00</td>
<td>4.45</td>
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<td>4.67</td>
<td>3.75</td>
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<td>-1.60</td>
<td>-4.32</td>
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<td>Electrical Machinery</td>
<td>4.38</td>
<td>3.21</td>
<td>4.80</td>
<td>-0.07</td>
<td>-1.02</td>
<td>2.14</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>5.04</td>
<td>4.33</td>
<td>4.55</td>
<td>0.28</td>
<td>1.70</td>
<td>-2.64</td>
</tr>
<tr>
<td>Other Transport</td>
<td>0.98</td>
<td>0.07</td>
<td>1.68</td>
<td>-1.13</td>
<td>0.73</td>
<td>-7.68</td>
</tr>
<tr>
<td>Jewelry</td>
<td>3.12</td>
<td>3.95</td>
<td>1.32</td>
<td>-4.41</td>
<td>1.22</td>
<td>10.09</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>2.22</td>
<td>1.82</td>
<td>3.16</td>
<td>0.26</td>
<td>0.97</td>
<td>6.45</td>
</tr>
</tbody>
</table>
Not only did a majority of industries have insignificant growth in TFP, 11 sub-sectors out of a total of 27 had negative TFP growth over two decades. Among the underperformers, all the capital goods industries had negative TFP growth, except for electrical machinery. The dubious distinction of the worst TFP growth goes to the industrial chemical industry. This reflects the massive investment in building liquid-fuel-from coal plants during 1979-1983. The share of the capital stock of the industrial chemical industry in that of total manufacturing had been about 15 percent until 1978. It then increased until it reached 35 percent in 1982, while the industry's share of total value-added in manufacturing showed little change over the entire period.

The rest of the manufacturing sector (Table C.4) had annual TFP growth of 0.5 percent per year over the entire period -- a significantly higher rate than the -0.1 percent for manufacturing as a whole. The gap between these two rates was even greater in the second sub-period -- 1 percent vs -0.4 percent.

Table C.4: Excluding the Industrial Chemical Industry

<table>
<thead>
<tr>
<th>Period</th>
<th>Output</th>
<th>Capital</th>
<th>Labor</th>
<th>TFP</th>
<th>Divisia TFP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972-1983</td>
<td>4.04</td>
<td>4.19</td>
<td>2.49</td>
<td>0.95</td>
<td>0.46</td>
</tr>
<tr>
<td>1983-1990</td>
<td>0.93</td>
<td>-1.20</td>
<td>-0.07</td>
<td>1.42</td>
<td>0.34</td>
</tr>
<tr>
<td>1978-1988</td>
<td>0.65</td>
<td>2.26</td>
<td>0.10</td>
<td>0.41</td>
<td>1.06</td>
</tr>
<tr>
<td>1972-1990</td>
<td>2.10</td>
<td>2.58</td>
<td>1.01</td>
<td>0.53</td>
<td>0.41</td>
</tr>
</tbody>
</table>

Source: Staff Estimates

---

9 This high incidence of negative TFP growth rates may seem to cast some doubt on the validity of these estimates. Some economists hold that negative TFP growth estimates are only a sign of serious measurement errors (Page, 1990), or feel doubtful "about the ability of economists to measure output and inputs adequately over time and across sectors, industries and countries." However, negative TFP growth over more than a decade has been repeatedly reported in the productivity analysis of U.S. or other OECD countries, where the quality of data is reasonably assured.

9 SASOL II was completed in 1980 at 4 billion Rand, and SASOL III in 1983 at 6 billion Rand (both are in 1985 prices). See Eberhard and Trollip (1992), p. 14, Table 2.
5. Variation Over Time in TFP Growth Rates

The previous section leads to the question whether the estimated TFP growth rates represent changes in technical efficiency or the result of business cycles and demand shocks. The procyclicality of productivity is widely acknowledged in work on the business cycle. The Keynesian explanation for procyclical productivity is based on labor hoarding or adjustment costs. Another interpretation takes procyclical productivity as evidence of monopolistic behavior of firms and persistent excess capacity. Our estimates are based on the assumption that capital begins to be productive one year after put in place. With a large-scale investment such that experienced by the industrial chemical industry, it takes more time for the plant to be running at optimal efficiency given the need for a learning process. The estimated time trend growth rates of inputs and output could also be disproportionately affected by the growing recession during the end years.

The data indeed show that the TFP growth rates show a wide fluctuation, moving closely with the business cycle; and that these are significantly affected by the choice of time span. These conclusions are drawn from Tables C.5 and C.6. Table C.5 gives the correlation of the TFP growth rates with rates of change of aggregate GDP, of gross output, of real value-added, of prices, and of wages for three digit manufacturing industries.

The first column gives the correlation of TFP growth with GDP growth, the second column gives the correlation with the growth in gross output, the third column gives the correlation with value-added, the fourth column gives the correlation with the industry price divided by the GDP deflator, the fifth column gives the correlation with growth in real wage.

---

10 See Hall (1986) for a new interpretation of procyclical productivity. Hall calculates the markup ratio of two-digit industries in the USA and shows most of them to be noncompetitive, so that their output can increase with little change in inputs. Thus, the slow residual that equates marginal cost and price will show procyclical productivity.

11 See Hall (1986) for a new interpretation of procyclical productivity. Hall calculates the markup ratio of two-digit industries in the USA and shows most of them to be noncompetitive, so that their output can increase with little change in inputs. Thus, the slow residual that equates marginal cost and price will show procyclical productivity.
Table C.5: Correlations of Adjusted TFP

with Changes in GDP, Output, VA, Price, and Wage

<table>
<thead>
<tr>
<th>Sector</th>
<th>GDP</th>
<th>Output</th>
<th>VA</th>
<th>Price</th>
<th>Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>0.16</td>
<td>0.24</td>
<td>0.42</td>
<td>-0.02</td>
<td>-0.08</td>
</tr>
<tr>
<td>Food</td>
<td>-0.09</td>
<td>0.26</td>
<td>0.61</td>
<td>0.11</td>
<td>-0.33</td>
</tr>
<tr>
<td>Beverage</td>
<td>0.54</td>
<td>0.55</td>
<td>0.65</td>
<td>-0.14</td>
<td>0.15</td>
</tr>
<tr>
<td>Tobacco</td>
<td>0.34</td>
<td>0.80</td>
<td>0.89</td>
<td>-0.30</td>
<td>0.44</td>
</tr>
<tr>
<td>Textiles</td>
<td>0.41</td>
<td>0.85</td>
<td>0.95</td>
<td>-0.11</td>
<td>0.08</td>
</tr>
<tr>
<td>Clothing</td>
<td>0.43</td>
<td>0.83</td>
<td>0.88</td>
<td>-0.53</td>
<td>0.57</td>
</tr>
<tr>
<td>Leather</td>
<td>-0.26</td>
<td>0.30</td>
<td>0.70</td>
<td>0.29</td>
<td>-0.16</td>
</tr>
<tr>
<td>Footwear</td>
<td>0.11</td>
<td>0.34</td>
<td>0.55</td>
<td>-0.28</td>
<td>-0.13</td>
</tr>
<tr>
<td>Wood and Wood Prod.</td>
<td>0.39</td>
<td>0.82</td>
<td>0.93</td>
<td>-0.09</td>
<td>-0.51</td>
</tr>
<tr>
<td>Furniture</td>
<td>0.16</td>
<td>0.62</td>
<td>0.70</td>
<td>-0.43</td>
<td>0.35</td>
</tr>
<tr>
<td>Paper and Paper Prod.</td>
<td>0.03</td>
<td>0.62</td>
<td>0.63</td>
<td>-0.04</td>
<td>-0.27</td>
</tr>
<tr>
<td>Printing and Publishing</td>
<td>0.31</td>
<td>0.67</td>
<td>0.73</td>
<td>-0.27</td>
<td>0.32</td>
</tr>
<tr>
<td>Industrial Chemicals</td>
<td>-0.16</td>
<td>0.06</td>
<td>0.13</td>
<td>-0.20</td>
<td>0.23</td>
</tr>
<tr>
<td>Other Chemicals</td>
<td>-0.01</td>
<td>0.60</td>
<td>0.86</td>
<td>-0.01</td>
<td>-0.07</td>
</tr>
<tr>
<td>Rubber</td>
<td>0.21</td>
<td>0.70</td>
<td>0.81</td>
<td>-0.01</td>
<td>0.46</td>
</tr>
<tr>
<td>Other Plastic</td>
<td>-0.02</td>
<td>0.78</td>
<td>0.84</td>
<td>-0.37</td>
<td>0.23</td>
</tr>
<tr>
<td>Pottery, China and Earth</td>
<td>0.24</td>
<td>0.85</td>
<td>0.82</td>
<td>-0.03</td>
<td>-0.14</td>
</tr>
<tr>
<td>Glass, and Glass Prod.</td>
<td>0.27</td>
<td>0.35</td>
<td>0.38</td>
<td>-0.34</td>
<td>0.02</td>
</tr>
<tr>
<td>Other Non-Metallic Mines</td>
<td>0.29</td>
<td>0.21</td>
<td>0.54</td>
<td>-0.44</td>
<td>0.41</td>
</tr>
<tr>
<td>Basic Iron and Steel</td>
<td>-0.25</td>
<td>0.67</td>
<td>0.74</td>
<td>-0.08</td>
<td>-0.06</td>
</tr>
<tr>
<td>Basic Non-Ferrous Metal</td>
<td>0.11</td>
<td>0.21</td>
<td>0.70</td>
<td>-0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Metal Products</td>
<td>0.09</td>
<td>0.29</td>
<td>0.51</td>
<td>-0.57</td>
<td>0.43</td>
</tr>
<tr>
<td>Machinery and Equipment</td>
<td>0.20</td>
<td>0.57</td>
<td>0.82</td>
<td>0.01</td>
<td>0.38</td>
</tr>
<tr>
<td>Electrical Machinery</td>
<td>0.36</td>
<td>0.66</td>
<td>0.63</td>
<td>-0.04</td>
<td>0.16</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>0.54</td>
<td>0.91</td>
<td>0.91</td>
<td>-0.38</td>
<td>0.47</td>
</tr>
<tr>
<td>Other Transport</td>
<td>-0.02</td>
<td>0.49</td>
<td>0.72</td>
<td>-0.11</td>
<td>0.47</td>
</tr>
<tr>
<td>Jewelry</td>
<td>0.12</td>
<td>0.68</td>
<td>0.83</td>
<td>-0.47</td>
<td>0.25</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>-0.23</td>
<td>0.62</td>
<td>0.73</td>
<td>-0.07</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Source: Staff estimate

The results are mixed. TFP growth in total manufacturing is not significantly correlated with the aggregate economy's output growth. Only seven out of twenty-six industries show significant correlation with GDP growth. However, the correlations with industry value-added, perhaps not surprisingly, are significant except in the industrial chemical industry. The correlation with the wage rate could shed some light on whether there are supply-side technology shocks, since, if there were, one would expect a positive correlation of TFP growth with real wage increases. Again, the evidence is ambiguous; some
industries show a positive correlation; others do not. Capital goods industries tend to show a positive correlation, but total manufacturing shows a negative relationship.

Taken as a whole, this seems to suggest that TFP growth rates in South African manufacturing are correlated with demand shocks rather than with real productivity shocks. As for the effect of business fluctuation on the estimated TFP growth, the literature breaks the periods between cyclical peaks to reduce the distortion in estimated TFP growth. In our case, the corresponding years are 1978 and 1988. The average of the annual Divisia TFP growth rates between 1978 and 1988 is about 0.24 percent per year for total manufacturing (against 1.06 percent per year excluding the industrial chemical industry). If 1989 and 1990 are included, it is 0.17 percent (against 1.02 percent per year excluding industrial chemicals). Even though on an aggregate level it is not significantly different from the growth rate for 1978-1988, they can be as different from each other at the individual industry level by as much as 2 percent. Clearly, the choice of end-points affects the estimation of TFP growth rate over a ten-year period, and true TFP growth is closer to the one obtained here between the peak years. In Table C.6, we present the two sets of estimates of the TFP growth rates for industries between 1978 and 1988.

Notice the significant difference in some industries between TFP growth rates obtained from using the period average of factor income share and the trend growth rates of inputs and output, and that obtained from using the Törnqvist-Divisia index. This difference comes from both the changing income share of factors, and the sharp fluctuations in capital stock at three-digit industry level. The question is which is better. Since we suspect that a large part of this difference comes from the wild swing in the year-to-year growth rates of capital, and because there is a discernible “trend” within our period of twenty years in that the share of capital increases, we find the Divisia TFPs less susceptible to bias. However, a period of ten or twelve years is too short to discern any long-term trend. As for the effect of a specific periodization, even though the numbers seem to indicate that the growth in TFP was better during the later sub-period than the first sub-period, this is largely due to our choice of 1983 as a mid-point and 1990 as the final year. TFP growth estimated between 1978 and 1988 is probably closer to what really happened in South African manufacturing.
Table C.6: TFP Growth Rates for 1978-1988

<table>
<thead>
<tr>
<th>Sector</th>
<th>TFP</th>
<th>Divisia TFP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>-0.32</td>
<td>0.24</td>
</tr>
<tr>
<td>Food</td>
<td>0.18</td>
<td>0.44</td>
</tr>
<tr>
<td>Beverage</td>
<td>1.19</td>
<td>1.71</td>
</tr>
<tr>
<td>Tobacco</td>
<td>2.62</td>
<td>5.76</td>
</tr>
<tr>
<td>Textiles</td>
<td>1.38</td>
<td>2.78</td>
</tr>
<tr>
<td>Clothing</td>
<td>0.19</td>
<td>1.57</td>
</tr>
<tr>
<td>Leather</td>
<td>0.29</td>
<td>0.14</td>
</tr>
<tr>
<td>Footwear</td>
<td>-0.01</td>
<td>-0.38</td>
</tr>
<tr>
<td>Wood and Wood Prod.</td>
<td>-1.48</td>
<td>0.11</td>
</tr>
<tr>
<td>Furniture</td>
<td>-3.83</td>
<td>-2.18</td>
</tr>
<tr>
<td>Paper and Paper Prod.</td>
<td>-2.19</td>
<td>-0.52</td>
</tr>
<tr>
<td>Printing and Publishing</td>
<td>1.61</td>
<td>1.59</td>
</tr>
<tr>
<td>Industrial Chemicals</td>
<td>-1.14</td>
<td>-4.07</td>
</tr>
<tr>
<td>Other Chemicals</td>
<td>-4.03</td>
<td>-0.68</td>
</tr>
<tr>
<td>Rubber</td>
<td>-0.71</td>
<td>1.33</td>
</tr>
<tr>
<td>Other Plastic</td>
<td>1.64</td>
<td>2.40</td>
</tr>
<tr>
<td>Pottery, China and Earth</td>
<td>-4.59</td>
<td>-2.43</td>
</tr>
<tr>
<td>Glass, and Glass Prod.</td>
<td>-2.04</td>
<td>-0.83</td>
</tr>
<tr>
<td>Other Non Metallic Minerals</td>
<td>-2.29</td>
<td>0.10</td>
</tr>
<tr>
<td>Basic Iron and Steel</td>
<td>2.85</td>
<td>4.48</td>
</tr>
<tr>
<td>Basic Non-Ferrous Metal</td>
<td>1.38</td>
<td>3.22</td>
</tr>
<tr>
<td>Metal Products</td>
<td>-0.85</td>
<td>-0.53</td>
</tr>
<tr>
<td>Machinery and Equipment</td>
<td>-3.67</td>
<td>-2.11</td>
</tr>
<tr>
<td>Electrical Machinery</td>
<td>0.87</td>
<td>1.75</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>-3.49</td>
<td>-1.03</td>
</tr>
<tr>
<td>Other Transport</td>
<td>-3.43</td>
<td>-2.57</td>
</tr>
<tr>
<td>Jewelry</td>
<td>5.72</td>
<td>3.59</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>3.14</td>
<td>3.34</td>
</tr>
</tbody>
</table>

Source: Staff estimate
The higher growth rate of the later period could also be partly due to underestimation of capital stock. As can be seen from Figure C.1, gross investment in manufacturing started to decline in 1981, collapsed between 1984 and 1988, and then recovered to its 1982 level. In total manufacturing, capital stock is reported to have declined at an annual rate of 0.4 percent between 1983 and 1990. Twenty-two out of twenty-seven industries are also reported to have had a decline of capital stock during 1983-1990. With this collapse in investment, and the severe recession, firms may have stretched the life of existing capital stock by not upgrading old-fashioned equipment or by intensifying maintenance work. If we assume the capital stock had not declined at all during the period as a upper limit, the resulting TFP growth rate would be 1.3 percent instead of 1.8 percent. This is still significantly higher than estimated TFP growth for the first period. Underestimation of capital stock may account for, at maximum, only about 30 percent of measured TFP growth during the second period even assuming no depreciation.

Figure C.1:
6. Comparison With Other Countries

In this section, we compare TFP growth in South African manufacturing with those of other countries for which TFP growth rate estimates are available. Table C.7 presents the annual growth rates of TFP in the manufacturing sectors of Japan, South Korea, India, Turkey, Yugoslavia, U.S.A., South Africa. Please note that the figures for other countries are based on gross output. To ensure comparability, the same measure is calculated for South Africa. The periods covered for most of the countries are much earlier than that for South Africa. The comparison may be biased by the effects of the world-wide productivity slowdown of recent years.

A quick look at the numbers suggests that indeed the performance of South Africa’s manufacturing sector has been dismal. In aggregate manufacturing, only India is behind, small consolation in view of the widely-held opinion that the performance of Indian manufacturing has been particularly poor, even by the standards of developing countries. On the individual industry level, too, South Africa lags behind South Korea and Japan, while in almost every industry, the growth rate of TFP is significantly higher in these countries.

In general, aggregate studies of the national economy or manufacturing have typically found a relatively smaller contribution of TFP growth to total in LDCs as compared to developed countries. Growth in the LDCs tends to be accounted for by the accumulation of inputs rather than by growth in TFP. This seems to apply to South African manufacturing. The average TFP growth among developing countries as reported in Chenery (1986) is 2.0 percent per year, while that for developed countries is 2.7 percent. However, most of these estimates are for periods that begin during the recovery years after World War II, and end before the onset of world-wide productivity slowdown.\textsuperscript{12} Tsao (1985) finds that while Singapore during the 1970s had a rapid growth in output and in exports, aggregate TFP growth was negative. One suspects that TFP growth may be higher for manufacturing than for the rest of the economy. But, as Pack notes, summarizing Chenery (1983), "While for some periods in some LDCs,

\textsuperscript{12} If we exclude Korea, Taiwan, and Hong Kong, the average becomes 1.75 percent.
the economy-wide residual is fairly high ... the residual in manufacturing ... is fairly close to zero.\textsuperscript{13}

\textsuperscript{14}According to a set of estimates of TFP growth rates by the World Bank, about two thirds of developing countries had a disappointing performance of less than 1 percent growth of aggregate TFP per year over 1960-1989. This is similar to our results for South Africa. This study seems to suggest that the growth of TFP in the South African manufacturing sector, while disappointing (as in many other developing countries), is not discouraging especially in view of the serious economic upheaval South Africa has suffered in recent years. This seems especially true if one accepts the Divisia growth rates or excludes industrial chemical industries. The real differences between the development of South African manufacturing and that of other developing countries are the low growth rates of labor and capital input. The rate of growth of labor input for developing countries given in Chenery (1986)\textsuperscript{15} is 3.3 percent. This compares with 1.0 percent in South Africa over two decades.

When the industrial chemical industry is excluded, the second feature emerges\textsuperscript{16}. The rate of capital accumulation in South African manufacturing seems to be comparatively low. During the first sub-period, it was 4.4 percent per year excluding industrial chemicals (against 7.8 percent including industrial chemicals)\textsuperscript{17}, and 3.0 percent per year (against 4.4 percent including industrial chemicals) for the entire period. The net effect was that the growth rate in the capital-labor ratio was lower than in rapidly-industrializing countries. The growth rate in the capital-labor ratio over the entire period was about 3.3 percent per year including the industrial chemical industry (vs. 2.0 percent excluding that industry).


\textsuperscript{14} Pack (1988, p.352, ft. 43) cites a World Bank work on China by Tidrick (1986) that finds zero or negative TFP growth for total manufacturing and many individual industries.

\textsuperscript{15} Chenery (1986), Table 2-2, pp. 22-2.

\textsuperscript{16} See Table C.3.

\textsuperscript{17} For the entire period, it is 3.0 percent per year.
South Africa - Economic Performance and Policies

Table C.7: Growth Rate of TFP

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>India</td>
<td>Yugoslavia</td>
<td>Turkey</td>
<td>Korea</td>
<td>Japan</td>
<td>South Africa</td>
<td>United States</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.6</td>
<td>0.5</td>
<td>1.3</td>
<td>5.3</td>
<td>2.0</td>
<td>0.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Food</td>
<td>-3.6</td>
<td>-0.6</td>
<td>1.9</td>
<td>2.2</td>
<td>0.1</td>
<td>1.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Beverage</td>
<td>-3.1</td>
<td>-1.7</td>
<td>0.4</td>
<td>1.3</td>
<td>0.2</td>
<td>-0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Tobacco</td>
<td>-3.6</td>
<td>1.0</td>
<td>1.4</td>
<td>4.5</td>
<td>1.7</td>
<td>0.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Textiles</td>
<td>-0.6</td>
<td>-0.2</td>
<td>2.7</td>
<td>1.6</td>
<td>1.9</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Clothing</td>
<td>-2.4</td>
<td>-0.1</td>
<td>-1.0</td>
<td>2.8</td>
<td>0.9</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Leather</td>
<td>0.7</td>
<td>0.7</td>
<td>2.7</td>
<td>1.6</td>
<td>1.9</td>
<td>0.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Footwear</td>
<td>0.8</td>
<td>-0.6</td>
<td>-1.2</td>
<td>5.6</td>
<td>1.1</td>
<td>0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Food Products</td>
<td>-3.0</td>
<td>-0.6</td>
<td>-1.2</td>
<td>5.6</td>
<td>1.1</td>
<td>0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Furniture</td>
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<td>3.2</td>
<td>4.9</td>
<td>-0.1</td>
<td>-0.1</td>
<td>0.3</td>
<td>1.3</td>
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<tr>
<td>Paper</td>
<td>0.1</td>
<td>0.1</td>
<td>1.4</td>
<td>4.5</td>
<td>1.6</td>
<td>0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Printing</td>
<td>0.2</td>
<td>0.4</td>
<td>1.4</td>
<td>4.5</td>
<td>1.6</td>
<td>0.1</td>
<td>1.3</td>
</tr>
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<td>Industrial Chemical</td>
<td>-5.6</td>
<td>0.2</td>
<td>0.4</td>
<td>0.7</td>
<td>-0.4</td>
<td>-0.8</td>
<td>-1.8</td>
</tr>
<tr>
<td>Other Chemical</td>
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<td>0.1</td>
<td>1.6</td>
<td>4.5</td>
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<td>-0.4</td>
<td>1.2</td>
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<td>Rubber</td>
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<td>2.3</td>
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<td>5.9</td>
<td>-1.2</td>
<td>0.3</td>
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<tr>
<td>Plastic</td>
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<td>0.3</td>
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<td>4.5</td>
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<td>1.3</td>
</tr>
<tr>
<td>Pottery</td>
<td>-1.2</td>
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<td>5.2</td>
<td>5.9</td>
<td>-1.2</td>
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<td>0.4</td>
</tr>
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<td>Glass</td>
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<td>-0.6</td>
<td>-0.2</td>
<td>1.9</td>
<td>1.0</td>
<td>1.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Other Non-Metallic</td>
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<td>-0.6</td>
<td>-0.9</td>
<td>1.9</td>
<td>1.0</td>
<td>1.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Basic Iron and Steel</td>
<td>-2.2</td>
<td>-0.6</td>
<td>-0.6</td>
<td>1.5</td>
<td>6.0</td>
<td>0.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Basic Non-Ferrous</td>
<td>-1.1</td>
<td>1.3</td>
<td>5.7</td>
<td>3.1</td>
<td>3.1</td>
<td>0.7</td>
<td>0.4</td>
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<tr>
<td>Metal Prod.</td>
<td>-0.2</td>
<td>-0.6</td>
<td>-0.25</td>
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<td>7.2</td>
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<td>5.1</td>
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<td>0.9</td>
<td>1.6</td>
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<td>Electrical Machinery</td>
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<td>3.3</td>
<td>5.1</td>
<td>2.5</td>
<td>0.4</td>
<td>0.9</td>
<td>1.6</td>
</tr>
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<td>Motor Vehicle</td>
<td>-1.2</td>
<td>-0.25</td>
<td>1.8</td>
<td>7.2</td>
<td>4.4</td>
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<td>0.9</td>
</tr>
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<td>3.3</td>
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<td>0.9</td>
<td>1.6</td>
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<td>Jewelry</td>
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<td>0.7</td>
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<td>1.3</td>
<td>0.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>-4.9</td>
<td>-0.6</td>
<td>-0.2</td>
<td>1.9</td>
<td>1.0</td>
<td>1.0</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Source: Staff estimate
Even in the first sub-period, the growth rate in the capital-labor ratio was just 1.9 percent excluding the industrial chemical industry (5.2 percent including the industrial chemical industry). In contrast, as shown in Table C.8, the growth rates in the capital-labor ratio for manufacturing are reported to be 6.3 percent for Japan, 7.7 percent for Korea, and 6.2 percent for Turkey. These countries, especially the East Asian countries, are not known to have pursued a capital-intensive industrialization strategy.¹¹

Table C.8: Growth Rate of Inputs and Output

<table>
<thead>
<tr>
<th></th>
<th>Yugoslavia</th>
<th>Turkey</th>
<th>Korea</th>
<th>Japan</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965-78</td>
<td>9.8</td>
<td>10.7</td>
<td>17.9</td>
<td>11.6</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2.4)</td>
</tr>
<tr>
<td>1963-76</td>
<td>7.7</td>
<td>11.2</td>
<td>13.0</td>
<td>10.8</td>
<td>4.4</td>
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<td></td>
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<td></td>
<td></td>
<td>(3.0)</td>
</tr>
<tr>
<td>1960-77</td>
<td>3.0</td>
<td>5.1</td>
<td>5.3</td>
<td>4.5</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1.0)</td>
</tr>
</tbody>
</table>

Source: Staff estimate

¹¹ One should be cautious in interpreting the growth rate of the capital-labor ratio especially in the East Asian countries. They are generally known to have both a high human capital endowment and growth in the latter for their income level. For example, according to the WDR (1992), the percentage of age group enrolled in secondary education in Korea increased from 35% in 1965 to 87% in 1988.¹⁸ If one adjusts for the change in labor quality, the corresponding growth rate of the capital-labor ratio would be reduced. However, this is unlikely to eliminate entirely the difference in growth rates in the capital-labor ratio between these sample countries and South Africa.
Once we agree that capital deepening in the South African manufacturing sector is not particularly high compared with other countries, then it seems that the pre-eminent feature of South African manufacturing sector is its stagnant growth in output, inputs and TFP. Employment creation seems minimal, not because there was a strong technical bias against labor, nor because it adopted an inappropriate capital-intensive technology, but primarily because output growth was stagnant. The main indicator for insufficient employment growth through the application of inappropriate technology is usually taken to be a high growth rate of labor productivity, such as the 7 or 8 percent per year observed in some Latin American countries\textsuperscript{19}. But in South Africa, labor productivity in manufacturing grew only at 1.2 percent. Among individual industries, the highest labor productivity growth is achieved by the beverage industry (4.3 percent), followed by basic non-ferrous metals (3.5 percent). These industries may represent to some degree the use of of an inappropriate technology, but even these numbers are far lower than one would expect from inappropriate capital-intensive industrialization. What ails the South African manufacturing is not so much capital-using bias and the resultant lack of employment creation, but stagnation of its industries because of inadequate growth in demand for their output.

7. Relationship of Productivity Growth With Other Variables

While the static gains from free-trade are well established in international trade theory, they provide little indication of the dynamic effects of trade on growth and technical progress. In contrast, the proponents of outward-oriented growth strategies predict a higher TFP growth from neutral trade policy. Exports are expected to generate greater TFP growth rates given: a higher rate of capacity utilization through market expansion; increased specialization according to factor endowment and intra-industry trade; faster absorption of new technology through contact with foreign markets; and reduction in X-inefficiency through increased competition from abroad.\textsuperscript{20} Advocates of import substitution argue differently. Their main platform is based on infant industry arguments that envision rapid productivity growth during the initial stage of industrial development. Thus, productivity growth can be used as the

\textsuperscript{19} See the discussion in Pack (1988), pp. 366-367.

\textsuperscript{20} But these are level effects, rather than growth effects. While they can contribute to economic growth in the intermediate-run, they do not change the steady state long-run growth rate.
major criterion in determining the success of import substitution.\textsuperscript{21, 22}

Table C.9 shows the results of decomposing growth at the aggregate level, and at the individual industry level. Notice the wide differences in domestic demand expansion, export expansion, and import substitution over time and in different industries.

To analyze the supply response of TFP growth to changes in the different components of demand changes, a cross-section regression was fitted relating the TFP growth rate of each individual sector against: output growth as accounted for by domestic demand expansion; output growth as accounted for by export expansion; and output growth as accounted for by import substitution.\textsuperscript{23} The equation used is:

\[
\text{TFPG} = \beta_0 + \beta_{dd}X_{dd} + \beta_{ee}X_{ee} + \beta_{ss}X_{ss} + \epsilon,
\]

where, TFPG is the annual growth rate of TFP, $X_{dd}$ is the output growth allocated to domestic demand growth, $X_{ee}$ is the output growth rate allocated to export expansion and $X_{ss}$ is the output growth rate allocated to import substitution. The period TFP growth rate of each 3-digit manufacturing industry is used as a dependent variable. For the explanatory variables, demand side decomposition of output growth in terms of percentage shares is combined with output growth rates.\textsuperscript{24} As can be seen from Table C.10,

\textsuperscript{21} Empirical testing would involve time-series analysis of effects of successive trade regimes in a country on productivity growth, or a cross-country analysis of the relationship between characteristics of trade regimes and productivity growth rates. This is beyond the scope of this paper.

\textsuperscript{22} Pack (1988), and Bruton (1988) review the empirical evidence of the relationship between TFP and trade regimes including works by Bhagwati(1978), Nishimizu and Robinson (1984), and Tsao(1985). They find that it is inconclusive.

\textsuperscript{23} Nishimizu and Robison (1984) investigated a similar relationship with time-series data for each of 13 common industries for Korea, Turkey, Yugoslavia, and Japan. Their regression is different: they ran the regression for each industry using time-series data. Due to the high collinearity between domestic demand and export growth, they did not include the domestic demand growth term. Strictly speaking, the decision to include export growth instead of domestic demand growth term is arbitrary, and one could interpret their results (as they partly concede) quite differently according to the prior bias or interest of the investigator.

\textsuperscript{24} A similar regression to the one presented here was reported in Belli, Finger, and Ballivian (1993) in a different format. In their paper, demand side decomposition of output growth was not combined with output growth rates.
the results show distinctively different pattern between the two periods. During the first period, only the export growth term is significant at the 5% significance level, and the estimated coefficient for import substitution term is negative though not statistically significant at the 5% level. During the second period, not only are the $R^2$ as high as 0.8546, but all terms are statistically significant with positive coefficients. This seems to suggest that during the first period, only export expansion is likely to have contributed to TFP growth, and that TFP growth during the second period is related to not just export expansion, but also to overall output expansion. Even though the estimated coefficient for import substitution is significantly positive during the later period, the relative contribution of export expansion is stronger than that of import substitution. To see this, note from Table C.9, that the export-expansion term is larger than the import-substitution term throughout the whole period. The positive import-substitution term during the second period is consistent with the hypothesis that the more liberal trade regime during this period allowed imports to increase market share in industries where TFP growth was flagging. The positive correlation between output expansion and TFP growth, known as Verdoorn's Law, has been one of the few consistently-obtained results from various studies into the relationship between trade policy and TFP growth, and is sometimes taken as indirect evidence of the existence of scale economies. The novelty of the current result is that this relationship is found using only cross-section data.

These results suggest that in South African manufacturing industries, demand created by export expansion is more likely to lead to growth in TFP than demand created by import substitution. Import substitution policy pursued in South Africa could be called as a failure on two counts; first, output expansion accounted for by import substitution is minimal as a whole; second, productivity growth is either negatively correlated with import substitution or positively correlated with domestic market share loss.

---

Table C.9: Decomposition of Demand Growth in Manufacturing (% of Output Growth)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output Expansion</td>
<td>Domestic Demand</td>
<td>Export Expansion</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>50.14</td>
<td>44.61</td>
<td>2.49</td>
</tr>
<tr>
<td>Food</td>
<td>49.99</td>
<td>48.20</td>
<td>1.19</td>
</tr>
<tr>
<td>Beverages</td>
<td>104.46</td>
<td>106.76</td>
<td>1.70</td>
</tr>
<tr>
<td>Tobacco</td>
<td>34.85</td>
<td>27.98</td>
<td>2.05</td>
</tr>
<tr>
<td>Textiles</td>
<td>43.24</td>
<td>35.97</td>
<td>3.10</td>
</tr>
<tr>
<td>Clothing</td>
<td>56.44</td>
<td>44.15</td>
<td>10.11</td>
</tr>
<tr>
<td>Leather</td>
<td>38.81</td>
<td>22.74</td>
<td>11.37</td>
</tr>
<tr>
<td>Footwear</td>
<td>30.38</td>
<td>30.29</td>
<td>2.43</td>
</tr>
<tr>
<td>Wood and Wood Prod.</td>
<td>54.09</td>
<td>36.95</td>
<td>5.60</td>
</tr>
<tr>
<td>Furniture</td>
<td>42.63</td>
<td>39.88</td>
<td>2.74</td>
</tr>
<tr>
<td>Paper and Paper Prod.</td>
<td>29.49</td>
<td>24.69</td>
<td>3.72</td>
</tr>
<tr>
<td>Printing and Publishing</td>
<td>36.57</td>
<td>42.86</td>
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<tr>
<td>Industrial Chemicals</td>
<td>81.76</td>
<td>65.75</td>
<td>4.14</td>
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<td>Other Chemicals</td>
<td>60.59</td>
<td>72.77</td>
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<tr>
<td>Rubber</td>
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<tr>
<td>Other Plastic</td>
<td>60.69</td>
<td>58.95</td>
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<tr>
<td>Pottery, China and Earth</td>
<td>15.71</td>
<td>-7.67</td>
<td>-0.85</td>
</tr>
<tr>
<td>Glass, and Glass Prod.</td>
<td>18.88</td>
<td>16.49</td>
<td>1.75</td>
</tr>
<tr>
<td>Other Non-Metallic Minerals</td>
<td>25.34</td>
<td>29.27</td>
<td>-1.41</td>
</tr>
</tbody>
</table>

Source: Staff estimate

Table C.10: Effect of Export Expansion and Import Substitution on Total Factor Productivity Changes

<table>
<thead>
<tr>
<th>Period</th>
<th>$\beta_0$</th>
<th>$\beta_M$</th>
<th>$\beta_w$</th>
<th>$\rho$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972-1983</td>
<td>-1.505</td>
<td>0.322</td>
<td>3.622</td>
<td>-0.971</td>
<td>0.3458</td>
</tr>
<tr>
<td></td>
<td>(-1.442)</td>
<td>1.133</td>
<td>(2.757)</td>
<td>(-1.968)</td>
<td></td>
</tr>
<tr>
<td>1983-1990</td>
<td>0.806</td>
<td>0.991</td>
<td>1.071*</td>
<td>1.351</td>
<td>0.8546</td>
</tr>
<tr>
<td></td>
<td>(2.546)</td>
<td>(6.624)</td>
<td>(7.877)</td>
<td>(2.856)</td>
<td></td>
</tr>
</tbody>
</table>

The t-values are reported in parentheses

Source: Staff estimate
REFERENCES OF ANNEX C


ANNEX D

THE PROTECTION REGIME AND EXPORT INCENTIVES IN SOUTH AFRICA
## ANNEX D: THE PROTECTION REGIME AND EXPORT INCENTIVES IN SOUTH AFRICA

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Annex D

The Protection Regime and Export Incentives in South Africa

1. The Protection Regime

South Africa has a complex protection system with a number of different instruments. These include: quantitative restrictions (QRs), customs duties, and import surcharges. Trade policy in South Africa has aimed primarily at supporting import substitution since the late 1920s. Its general emphasis has been on ensuring "moderate and selective protection" for firms supplying a "substantial" share of the domestic market against "normally" priced imports. Up to 1972, a substantial portion of protection was supplied through quantitative restrictions (QR). In that year, the authorities began to substitute tariffs for QRs—a process that accelerated towards the middle of the decade—and introduced an "Export Development Assistance" scheme to spur exports. This involved a tax allowance for marketing expenses incurred in connection with export efforts. The main result of the protection regime has been to make producing for the domestic market vastly more profitable and attractive than producing for export.

In 1980 the authorities introduced a more powerful system of export incentives. In 1983 the process of eliminating QRs accelerated: at the same time the authorities liberalized the market for foreign exchange by merging the financial and commercial rand, effectively abolishing exchange rate controls on non-residents (although the financial rand was re-introduced later in the decade). The substitution of tariffs for QRs, involved some liberalization because the new tariff levels were lower than the tariffs

1 Based on P. Belli, 1993).
2 Reynders Commission Report.
3 In response to the recommendations of the van Huysteen Committee.
The authorities also relaxed import permits by switching from a positive list (specifying the goods subject to import permits) to a negative list (specifying the goods that did not require an import permit). Further relaxation of QRs has occurred since 1985, and at present few QRs remain (mainly on agricultural goods and textiles). Tariffs are now the main instrument of protection.

Despite the substantial liberalization of the trade regime in the last decade, serious problems remain. First, the system is subject to excessively frequent changes. Second, the tariff structure is over complex. Third, the dispersion of the tariff schedule is exceedingly high. Fourth, the regime is biased against exports.

Fluidity of the System: Tariffs are set on a day-to-day basis in response to requests from the business community. The system of protection does not seek to protect any particular sector or factor of production. Protection is granted as long as the firm requesting it is able to supply a "substantial" proportion of the domestic market, and the request satisfies the Board of Trade and Industry that it cannot compete against "normally" priced imports. The Board, entertains requests for rate revisions in times of exchange rate and domestic price instability if there is "...disruptive competition and material injury or the strong probability of both..." The private sector takes full advantage of the opportunities provided by Government to solicit changes (usually increases) in protection. In 1991, the Board reviewed 570 applications, of which 174 were approved, 172 rejected, and 84 withheld.

The fluidity of the tariff schedule creates great uncertainty. To be sure, protection is not granted indiscriminately and, on paper at least, the procedure is subject to guidelines: the Board frowns on "excessive" protection and hesitates to grant protection exceeding 25 percent ad valorem on consumer goods and intermediate products or 20 percent on basic materials used as industrial inputs. The Board

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4 The proportion of the value of imports subject to QRs was reduced from 77 percent in 1983 to 55 percent in 1984, to 23 percent in 1985 (the proportion of tariff items subject to QRs was reduced to 28 percent) and tariffs were raised to compensate for the elimination of QRs. See, Trevor Bell (1993).

5 Board of Trade and Industry, Annual Report, 1991, p.3.
also sets limits on the levels of effective protection:

"It is Government policy that levels of effective protection ... should not usually exceed 30 per cent... Effective protection of 30 to 50 percent is normally recommended only in cases where the protected industry makes a considerable contribution to the economy in the form of economic growth, employment, or technological advance; while the encouragement of industries that require over 50 percent effective protection should be held to a minimum."^6

Despite the guidelines, the changes are far too frequent and levels of protection are far higher than the guidelines suggest.

**Complexity of the System:** Owing in part to the frequent changes and the absence of an overall tariff policy, the South African tariff structure is one of the most complex in the world. South Africa has more tariff rates than any other, the range of tariffs is the widest, and the coefficient of variation (ratio of standard deviation to the mean) of the tariff rates is the second highest. Thus, while the runner-up, Nepal, has 87 tariff rates, South Africa, has 35 *ad valorem* rates, and 2,865 lines with either formula, specific, or other type of duty (each of which can be interpreted as a different rate). There are 200 different *ad valorem* equivalents, or more that twice the number of rates in Nepal. The four surcharge rates, of course, add another level of complexity. Compared to Chile, with a single rate, or Mexico with five rates, South Africa's trade regime appears extremely unwieldy.

In addition, the manner of levying the tariff is complex. Some rates are *ad valorem*, some are specific, some are levied according to complex formulae, some combine specific and *ad valorem* elements. Numerous exemptions are granted on a firm-by-firm basis, rendering the tariff importer-specific rather than product-specific. Import levies include ordinary customs duties, and import surcharges. The former can be *ad valorem*, specific or a combination of both; the latter are imposed on a subset of goods and are generally *ad valorem*, except for fuels. There is also a fuel levy on petroleum and petroleum products, and there are anti-dumping duties on a limited number of products.

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*Annex D - The Protection Regime and Export Incentives in South Africa*
Ordinary Customs Duties are of two types: *ad valorem* rates and so-called "formula" duties. Some tariff items are subject only to *ad valorem* rates, others only to formula duties and others have an *ad valorem* rate and a formula duty. In the latter case, the rate of duty yielding the higher amount is applied.

In principle, formula duties are supposed to protect local firms from "disruptive" competition, which can mean dumping, subsidized exports, end-of-season sales at marginal prices, arbitrary pricing in centrally-planned economies, and price manipulation in intra-group transactions within multinationals. In practice, formula duties are applied to counter both normal and "disruptive" competition and many items carry both an *ad valorem* and a formula duty. In most cases the formula duty is equal to the normal *ad valorem* duty plus the full amount of the difference between a reference price and the FOB price in the country of origin.

Protection granted through formula duties provides wide room for discretion because the level of protection depends critically on the reference price. While commodity prices are easily checked and revised by referring to international market prices, prices of manufactured products are more difficult to check and domestic firms are the usual sources for reference prices. Usually reference prices are based on European or American goods; prices from Asian countries are not usually used as reference, even though they are probably the more appropriate reference as they are often more efficient and cost-competitive than their European and American counterparts.

The *ad valorem* duty on crude corn oil, for example, is 20 percent. The reference price is 165 cents per kilogram. The formula duty is 20 percent plus the difference between the FOB price in the country of origin and 165 cents per kilogram. If the actual FOB price is less than the reference price the formula duty applies. In the extreme case where import price is zero, the applicable duty would be 165 cents per kilogram. As the import price increases, the formula duty decreases in absolute terms. If the import price is equal to the reference price, the formula duty and the *ad valorem* rate yield the same result. For import prices greater than the reference price, the *ad valorem* rate applies and the duty
increases in direct proportion to the price. Formula duties, then, yield a V-shaped yield curve and place a floor on the price of imported goods equal to the reference price. As a percent of the price, the formula duty is equal to the ad valorem rate plus the proportion by which the reference price exceeds the import price. Thus, if the duty is 20 percent and reference price exceeds the import price by 30 percent, the total duty is 50 percent.

The ostensible reason for using formula duties is to compensate for "disruptive forms of competition,". In most countries, countervailing duties apply to goods coming from particular countries and are levied after ascertaining the reasons for the divergence between the price in the country of origin and the export price. In South Africa, formula duties apply regardless of the country of origin of the goods and without the benefit of an investigation elucidating the reasons for divergence between the import price and the reference price. The application of formula duties implies that if the export price in the country of origin is lower than the reference price, that is evidence of disruptive competition.

Import Surcharges: Many imports are subject to import surcharges at rates of 5, 15 or 40 percent of the import value. Import surcharges were introduced in 1988 to compensate for balance of payments disequilibria caused by sanctions. Although surcharges were intended to be temporary, they have remained in place despite favorable developments in the balance of payments. At present, 19.9 percent of tariff lines have no surcharge and no duty, 11.2 have no surcharge, are subject to ad valorem duties, and 8.5 percent have no surcharge but are subject to formula or specific duties. These surcharges may be waived on imports from certain countries.

Dispersion in the Tariff Schedule: The complex tariff structure has a wide dispersion. While a comparatively large proportion of items is zero-rated, a high proportion has high rates. In fact, South Africa's highest tariff is not only the highest in the sample, but more than twice that of its closest competitor's--Egypt's--600 percent. The number of high rates, combined with the high number of low rates yields a coefficient of variation second only to Nepal's. No statistical measure, however, fully captures the peculiarities of the South African trade regime. For example, the highest rate (1,389
percent) applies to only one product: woven polyester fabrics, containing less than 85 percent by mass of such fibers, mixed mainly or solely with cotton, of a mass between 300 and 350 grams per square meter. The second highest rate (1,320 percent) also applies to only one product. In fact, all tariff rates above 400 percent affect only 26 lines. Many of these lines are flanked on both sides by products with significantly lower tariffs. The line immediately preceding the product with a tariff of 1,320 percent has a tariff of only 10 percent and the one immediately after has a tariff of only 29 percent. The economic rationale behind this laser-beam approach to protection is not apparent and it is doubtful that the approach serves as an effective protective device. For example, one gram per square meter difference in the weight of a fabric might mean the difference between 1,389 percent duty, or 150 percent. To make the differentiation effective, the customs authorities would have to inspect closely every shipment to ensure that the description coincides with the product. Enforcement costs would be severe.

**Statutory Tariffs:** The preceding analysis is based on the unweighted statutory tariff rates. It is customary to weight the tariff rates by the country's "own" trade weights (imports, for example), or world trade weights. Using the country's own imports introduces a downward bias in the resulting statistics because very high tariffs deter imports, and items subject to high import duties enter the calculations with low weights. In South Africa, except to consumer goods and goods of agricultural origin, the difference between weighted and import-weighted averages are not markedly different. The unweighted statutory tariff is equivalent to 29 percent, while the import-weighted tariff is equivalent to about 28 percent. Table D.1 shows the frequency distribution of nominal tariffs while Table D.2 shows its sectoral distribution.

A more detailed breakdown indicates roughly the same pattern: the import-weighted average duty and the unweighted average duty on capital goods and intermediate goods are very similar, between and within categories. The only significant difference occurs in consumer goods, where the weighted average is 60 percent while the unweighted average is 48 percent. Save for consumer goods and goods of agricultural origin, then, the analysis can be carried out using the weighted or the unweighted average.
Table D.1: The Incidence of Nominal Protection

<table>
<thead>
<tr>
<th>Tariff Intervals</th>
<th>Number of Tariff Lines</th>
<th>Percentage of Tariff Lines</th>
<th>Cumulative Percentage of Tariff Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2699</td>
<td>19.8</td>
<td>19.8</td>
</tr>
<tr>
<td>1-10</td>
<td>3297</td>
<td>24.2</td>
<td>44.1</td>
</tr>
<tr>
<td>11-15</td>
<td>919</td>
<td>6.8</td>
<td>50.8</td>
</tr>
<tr>
<td>16-20</td>
<td>854</td>
<td>6.3</td>
<td>57.1</td>
</tr>
<tr>
<td>21-25</td>
<td>1461</td>
<td>10.7</td>
<td>67.8</td>
</tr>
<tr>
<td>26-30</td>
<td>821</td>
<td>6.0</td>
<td>73.9</td>
</tr>
<tr>
<td>31-35</td>
<td>840</td>
<td>6.2</td>
<td>80.0</td>
</tr>
<tr>
<td>36-40</td>
<td>414</td>
<td>3.0</td>
<td>83.1</td>
</tr>
<tr>
<td>&gt;40</td>
<td>2301</td>
<td>16.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: IDC, Department of Economic Research and Development

Protection and Anti-Export Bias: From the point of view of the average statutory tariff (weighted by the value of imports) South Africa is not an over-protected country.78

A word of warning about the data. Formula duties and specific duties present a problem of valuation and comparison. By definition, specific duties are levied on the weight, number, or volume of a good. The rate of duty with respect to the value of the good is likely to differ with each shipment. The formula duties, on the other hand, do not entail a single rate of protection, but depend critically on the relationship between the reference price and the actual price of the good. To calculate rates and make comparisons possible, the South African authorities provided an ad valorem equivalent of both formula duties and specific duties. The resulting rates, however, are subjective and depend on the assumed reference price.

The present analysis is based on the 1989, 1990 and 1991 tariff schedules. Because of the frequent changes in the tariff schedule, any analysis of the South African trade regime is a snapshot valid for only a short time. In 1990 the schedule consisted of 13,609 items of which 1,791 items showed no imports, although the items in question could have been imported duty-free. Most of these items were catch-all categories ("not included elsewhere") for items that would otherwise elude description.
Table D.2: Nominal Rates of Protection

<table>
<thead>
<tr>
<th>Sector</th>
<th>Weighted Mean</th>
<th>Unweighted Mean</th>
<th>Minimum Rate</th>
<th>Maximum Rate</th>
<th>Coefficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Economy</td>
<td>28</td>
<td>29</td>
<td>0</td>
<td>1,389</td>
<td>159.8</td>
</tr>
<tr>
<td>Agriculture</td>
<td>23</td>
<td>16</td>
<td>0</td>
<td>147</td>
<td>144.9</td>
</tr>
<tr>
<td>Mining</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>20</td>
<td>186.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>28</td>
<td>30</td>
<td>0</td>
<td>1,389</td>
<td>158.4</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>60</td>
<td>48</td>
<td>0</td>
<td>1,389</td>
<td>125.5</td>
</tr>
<tr>
<td>Intermediate Goods</td>
<td>17</td>
<td>18</td>
<td>0</td>
<td>1,320</td>
<td>198.9</td>
</tr>
<tr>
<td>Capital Goods</td>
<td>19</td>
<td>17</td>
<td>0</td>
<td>135</td>
<td>103.5</td>
</tr>
</tbody>
</table>


The average statutory tariff is 27.5, placing South Africa just above the median in a sample of 30 developing countries for which the Bank has comparable data. With the exception of mining products in which South Africa’s tariff is among the lowest in the world, the average statutory tariff is about average or below most developing countries. Compared to developed countries (GATT treats South Africa as a developed country), South Africa is a highly protected economy, with an average duty rate twice as high as New Zealand’s, the country with the next highest average tariff.

**Sectoral Incidence of Protection:** The sectoral incidence of nominal protection is uneven. Agriculture and manufacturing are the two most protected sectors, while mining— the backbone of the South African economy—is virtually unprotected. Nominal protection on manufacturing is on the order of 30 percent, while nominal protection for agriculture is on the order of 16 percent to 23 percent;
however, tariff protection on agriculture is complemented with numerous QRs, while QRs for manufacturing are few and fall mostly on the textiles subsector. Within manufacturing, two subsectors enjoy high nominal protection: textiles, apparel, and leather products, and non-metallic minerals. Nominal protection rates on the other subsectors are close to the average, with the exception of the lightly-protected basic metals subsector. Within textiles and leather products, protection is higher for wearing apparel and footwear. Protection on non-metallic minerals falls mainly on ceramic products and "other" non-metallic mineral products.

In conclusion, tariff-based protection in South Africa is about average for developing countries, but extremely high by developed country standards. The main problem is not the overall rate, but the dispersion, complexity, and instability of the system. Tariff-based protection protects manufacturing more than agriculture and the latter more than mining. Within manufacturing, consumer goods are more protected than capital goods, and the latter more than intermediate goods. The textiles, apparel and leather subsector is clearly the most protected of all subsectors: the average rate is the highest, the maximum rate applicable to the sector is the highest of the entire economy, and the coefficient of variation is lower than for the economy as a whole, indicating that protection is not only higher, but consistently higher than for the rest of the economy.

The non-metallic minerals subsector is the second most protected one, with the highest weighted average tariff, second highest unweighted average tariff, second highest maximum rate, and the highest coefficient of variation. These results hold broadly, whether weighted or unweighted statutory tariffs, or tariff collection ratios are used.

Effective Protection: Nominal rates of protection give only a partial (sometimes distorted) view of the effects of the trade regime. QRs may increase the price of a product in the domestic market far above what the tariff alone would allow. But domestic competition may decrease the price below what the tariff would allow. Even in the absence of QRs, the effect of the tariff on value-added depends on the relationship between the tariff on outputs and the tariff on inputs. The whole purpose of protection
is to increase the value-added in the protected activities by increasing the price of the protected output. If, however, the tariff on inputs is higher than the tariff on output, the net effect may be to reduce value-added relative to a free-trade situation.

In South Africa, where tariffs are levied on both inputs and output, and where protection is granted virtually on demand, nominal protection on a particular product does not necessarily mean that the producing firm's value-added is higher as a result. Protection of the output of a particular firm may be neutralized by the higher costs that the firm may incur on account of the higher prices it must pay for its inputs. For these reasons, a measure of effective protection is essential to ascertaining the net impact of trade policies and domestic market conditions on the value-added in production. The effective rate of protection is designed to capture the effect by comparing the percentage difference in value-added between actual and hypothetical free trade conditions.

The Industrial Development Corporation of South Africa (IDC) conducted an effective protection study of the South African trade regime using 1989 data. The study assumed that firms set their prices up to the limit allowed by the tariff. From information gathered by the World Bank through firm-level interviews, this assumption appears realistic. IDC's study shows that on average, protection on inputs was about 13 percent, while protection on output was about 18 percent and effective protection on the order of 30 percent, indicating that value-added is 30 percent higher than it would be under free-trade conditions. Of course, there are marked variations in protection between and within product categories, with protection on output (for subsectors, not individual products) reaching as high as 84 percent and as low as zero, and protection on inputs reaching as high as 87 percent and as low as zero. These ranges were calculated at the 4-digit ISIC level and mask wider variations that occur at the product specific level. A summary of the results (2-digit ISIC level) appears in Table D.3.

As Table D.3 shows, trade policies have succeeded in increasing value-added as compared to a free-trade situation (for every manufacturing sub-sector at the 2-digit level of aggregation, not necessarily for every firm in the economy).
### Table D.3: Estimates of Effective Protection

(Percentages)

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Protection on</th>
<th>Effective Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inputs</td>
<td>Output</td>
</tr>
<tr>
<td>Food, Beverages and Tobacco</td>
<td>15.2</td>
<td>13.7</td>
</tr>
<tr>
<td>Textiles, Apparel &amp; Leather</td>
<td>27.8</td>
<td>43.6</td>
</tr>
<tr>
<td>Wood &amp; Wood Products</td>
<td>14.0</td>
<td>21.7</td>
</tr>
<tr>
<td>Paper &amp; Paper Prod.</td>
<td>9.5</td>
<td>13.3</td>
</tr>
<tr>
<td>Chemicals</td>
<td>7.5</td>
<td>18.9</td>
</tr>
<tr>
<td>Non-Metallic Minerals</td>
<td>5.2</td>
<td>19.8</td>
</tr>
<tr>
<td>Basic Metal</td>
<td>4.7</td>
<td>11.2</td>
</tr>
<tr>
<td>Metal Products &amp; Equipment</td>
<td>17.1</td>
<td>18.2</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>2.8</td>
<td>10.9</td>
</tr>
<tr>
<td>Total Manufacturing</td>
<td>12.6</td>
<td>17.8</td>
</tr>
</tbody>
</table>

Source: Ondersoek Na Die Tariefbeskermings beleid. Ontheeling van die Tariefstruktuur. IDC, June 1990.
The textiles, apparel and leather sub-sector enjoys the highest rate of effective protection, with three times the average for the manufacturing sector; its value-added is nearly double what it would be under free-trade conditions. The metal products subsector appears at the other end of the spectrum, with effective protection of only 20 percent. The variations at the 4-digit level of detail are even more pronounced, with effective protection rates ranging from -21 percent for meat processing to 421 percent for pottery, china and earthenware. It is indicative of the thrust of trade policy that effective protection rates vary from negative to positive for closely related industries, according to the degree of processing; (-21 percent for grain mill products versus 139 percent for bakery products and -26 percent for wool and cotton finishing as compared to 94 percent for spinning and weaving textiles). This feature reveals a clear tendency towards the promotion of increasing local value-added, in accordance with the stated policy objectives of beneficiation. The mining sector (that sells mostly abroad), receives no protection in the domestic market. Nevertheless, mining firms buy their inputs from other firms that receive protection and consequently pay more for those inputs than under free-trade conditions. As a result, effective protection for the mining industry is negative, (its value-added is lower than under free-trade conditions).

**Anti-Export Bias:** Protection inevitably introduces an anti-export bias on two counts. First, it makes sales at home more lucrative than sales abroad by allowing firms to raise prices in the domestic market above those that would prevail under free-trade conditions. Second, it makes exporting firms less competitive internationally by increasing the cost of their inputs, hence their costs of production. There are several ways to counteract the policy-induced anti-export bias. Effective duty drawback schemes, export-processing zones, and subsidies, are among the most commonly-used instruments. South Africa has some of these instruments in place, but they are not commonly used and their effectiveness is doubtful. As a result, the policies in place tend to make production for the domestic market far more profitable than production for export. Unlike some export-oriented Asian countries where such differences also exist, but where important advantages to exporting are not fully captured in price differentials (because of hidden and not so hidden subsidies, and sanctions against poor performers), prices in South Africa capture the full economic advantages of exporting. To counteract the negative effects of protection on exports, South Africa has put in place duty rebates, duty drawbacks, and export
subsidies in various forms.

2. Export Incentives in South Africa

**Customs Duties Drawbacks and Exemptions from Customs Duties:** Under the Customs and Excise Act, exporters are eligible for drawbacks (item 521.00) or exemption (item 470.03) of customs duties paid or payable on imported materials used in making or packaging goods for export. Relief from customs duties can be permanent or be granted on a specific transaction. Permanent relief is granted in accordance with standing provisions for drawbacks for materials used in the manufacture, processing, and so on of specific products for export. By contrast, specific relief is temporary and takes the form of rebate of duty, granted on importation of certain materials stipulated in permits for the manufacture of specific products for export.

Schedule 5 of the Customs and Excise Act contains the list of goods eligible for (permanent) drawbacks of customs duties, when used in connection with the manufacture, processing or packaging of exported goods. The list specifies the tariff lines and the associated industries that qualify for drawback. In virtually all cases, the extent of the drawback is the full duty paid upon importation of the good in question. Schedule 6 of the same Act lists the goods eligible for rebates and refunds of excise duties. This list includes a limited number of excisable goods exported or used in the manufacture of other exported goods. The list includes alcoholic beverages, manufactured tobacco, petroleum oils and new motor vehicles.

The procedure for granting duty drawbacks and exemptions is oriented towards protection rather than facilitation of exports and the Board urges exporters to use imported raw materials "... only if domestically produced alternatives are not available in the right quantity or at a price that will enable the manufacturer to compete successfully in the export market." An exporter applying for drawback or

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9 Besides these, there are provisions for duty exemption or rebate on importation of specific products, (on medical insignia, on components for the manufacture of microwave ovens, for textiles). The 1991 Annual Report of the Board of Trade and Industry lists eight categories, in addition to provisions 470.03 and 521.00.
exemption must submit proof that the material will be used only in the production of the named end-product for export; a justification for using imports rather than domestic goods; proof that local industry cannot supply the inputs; and estimates of quantity and FOB value of the material contained in the end-product exported and the amount of customs duties involved. Firms make little use of duty drawbacks and exemptions. A company official from one firm interviewed for this report did not even bother to apply for drawbacks, despite being eligible, because "...the duty drawback system is administered by the Board of Trade and Industry, which protects local industry." In 1991 there were only 319 applications under 470.03 and 38 under 521.00, of which the Board rejected only 2 (under 470.03).

The General Export Incentive Scheme (GEIS): This major export incentive scheme dates back to April 1990. GEIS was designed to help firms offset the price disadvantage South African exporters faced in international markets. According to a study undertaken by the South African Chamber of Business (SACOB), South African manufacturing costs are 15 percent higher than the OECD average, mainly because South African manufacturing firms pay 24 percent more than their OECD counterparts for their inputs, but also because their capital and productivity-adjusted labor costs are higher. GEIS provides a tax-free financial subsidy to exporters based on the value of exports, the degree of processing and the local content of the exported product. Under GEIS, exports fall into one of four categories: primary products (take logs and minerals as our example), beneficiated primary products (products with some degree of processing -- saw logs, billets), material-intensive products (planed planks, sheet metal), and manufactured products (furniture, steel cabinets). The export subsidy increases with the level of beneficiation (processing), the level of local content, and with the value of the rand against a basket of currencies. The subsidy applies to most exports. About R800 million was budgeted for GEIS payments the first year. By March 1992 GEIS payments were running at a rate of R2 billion per year. Because GEIS increases in proportion to the percentage of local content, exporters must choose between the duty drawback scheme or GEIS. Not one company interviewed in connection with this study used the drawback system; most took advantage of GEIS.

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Exporters' Allowances: Various export incentives are intended to partially compensate costs incurred in the development of new export markets for South African products. The "marketing allowance" is given to tax-paying exporters of goods and services. It is calculated as a percentage of marketing expenditures incurred in the development of export markets, which is deductible from taxable income. Normally, up to 75 percent of actual expenditures can be deducted, but if an increase of 10 percent or more in the exporter's basic export turnover is achieved within a specified period, the full amount of marketing expenditures may be deducted. Marketing expenditures incurred on exports to Namibia, Botswana, Lesotho, Swaziland or any other country formerly included as part of South Africa, are excluded from this benefit.

Because of the large number of applications for this incentive, tax rebates have been limited to 20 percent of export turnover: the scheme was due to expire on March 31, 1992. The Export Marketing Assistance (EMA) Scheme gives partial compensation for transportation costs and subsistence allowance for travel for primary export market research, outward selling trade missions and inward buying missions. The scheme also grants financial assistance to companies wishing to participate in specialized trade fairs outside the Southern Africa Customs Union area. The Department of Trade and Industry also bears the costs of trade fairs where South Africa participates officially by means of a national pavilion and the costs of transportation of exhibition and publicity material. Reduced air freight rates for fresh produce and flowers are available under this scheme.

Other Incentives: The Department of Trade and Industries, in co-operation with the Credit Guarantee Insurance Corporation of Africa Ltd., administers a scheme called "export credit re-insurance," which provides insurance and financing facilities to exporters. The insurance covers commercial, political and transfer risks at a premium. Where the export of large capital projects which are repaid over a

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11 Basic export turnover is defined as the average of the three lowest yearly export sales during the previous five years.

12 Assistance for primary export marketing research is granted only to exporters in a tax-loss position. Otherwise the marketing allowances are applicable.
number of years is involved, the Department of Trade and Industry subsidizes the interest rate to the same
level as the "consensus interest rate of the OECD countries". Under the export development finance
scheme, expansion of export manufacturing capacity may be financed at reduced rates by the Industrial
Development Corporation. Financial assistance is available from ISCOR for exporters of fabricated
products containing iron or steel, exports of certain filled containers and use of certain iron or steel
products in the repair of foreign ships. ISCOR grants special price rebates for steel used in the
manufacture of export products.

**Sector-Specific Export Incentives:** A special program designed to promote the local
automobile industry is known as Phase VI of the Local Content Program for the Motor Vehicle
Manufacturing Industry. The program requires a local content of 66 percent of the value of the final
product to be eligible for tax relief and export incentives. The schemes includes rebates of excise duties
on motor vehicles, according to the percentage of local content.

What is the net effect of these policies on export incentives? The anti-export bias coefficient
is a measure commonly used to compare the effects of domestic policy on incentives to export. This
coefficient indicates the extent to which policies increase value-added in production for the domestic
market compared with the extent to which policies increase value-added in production for exports
(assuming free-trade conditions). If policies raise value-added for domestic production more than for
export, the anti-export bias coefficient is greater than one. If policies render exports more attractive than
domestic production, the anti-export bias coefficient is less than one. If policies are neutral, then the
coefficient is exactly one. In the rare cases where value-added for either domestic or export production
is negative, the coefficient is negative.

Ideally, the methodology for measuring anti-export bias relies on firm-level interviews and on
direct price comparisons. Neither the time nor the resources were available to conduct such a study: the
results reported in this document rely mainly on the data collected by IDC to estimate effective

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protection, complemented with data from a small, non-representative sample of firms visited in connection with the research. Most of the estimates were derived from input-output coefficients; they are the best available. However indicative, the results point to a policy-induced anti-export bias mitigated by arrangements between South African suppliers of inputs and exporters. The results also indicate that GEIS is crucial in stimulating exports, although its success in stimulating investment in export activities is questionable.

For the manufacturing sector as a whole, protection on inputs raises their cost by 12.6 percent, compared to a free-trade situation. In sales for the domestic market, higher input costs are offset by higher output prices (on average 17.8 percent higher than under free-trade conditions). Exports, however, must be sold at world prices less transport costs. Higher input costs mean lower profits and lower value-added.

GEIS is important in making exports profitable. On average GEIS represents about 8.4 percent of the value of output, but because GEIS is a tax-free subsidy, its value for the firm must be adjusted by the firms' marginal tax rate. In 1991, the corporate marginal tax rate was 50 percent, which meant that the taxable equivalent of GEIS was 16.8 percent, on average. This additional revenue increases value-added in exports by an amount estimated at 83.9 percent in 1991. Without GEIS value-added in domestic sales would have been 88.6 percent higher than in exports; with GEIS the difference was 2.5 percent. Without GEIS South Africa could not sustain the present level of manufactured exports.

Because of the tremendous dispersion in nominal protection and in GEIS, the effects of policy on the different subsectors is very markedly disparate. The anti-export bias coefficient ranges from a high of 1.64 (for textiles) to a low of 0.70 (for paper and paper products). Textiles illustrate the effects of present policies. Protection on inputs varies according to the subsector, from 17 percent to 84 percent, while protection on output ranges from 9 percent to 87 percent. Effective protection ranges from a low of -26.1 percent to a high of 239.3 percent. As a percent of the value of exports, GEIS ranges from a low of 1.19 percent to a high of 19.1 percent. GEIS is not related to protection inputs or to the degree...
of effective protection in the domestic market. As a result, out of nine subsectors, policies are pro-export biased in two cases, anti-export biased in five cases, and extremely anti-export biased in two cases.

3. Options for Reducing the Anti-Export Bias

Free access to imported raw materials, intermediate goods, and capital equipment used in the production of exports is particularly important for the creation of new companies and product diversification. This means automatic availability of inputs free of import and foreign exchange restrictions as well as from tariffs and indirect taxes. The most important criterion is that eligibility for duty-free importation of imports be automatic for anyone with an export order. There should be no suggestion that access to duty-free imports be conditioned on unavailability of the input from a South African source: as long as this barrier remains, the South African supplier is protected from international competition and the upstream producer will be the sole gainer. The discipline of international competition is particularly important in the South African economy, where there is minimal competition from other domestic suppliers.

There are several ways of achieving free access. The most straightforward is to establish a free-trade regime for the entire economy. This is the approach adopted by Singapore and Hong Kong. A free-trade regime for South Africa would not be advisable at this juncture because of its transition costs. Some of the most protected sectors employ considerable numbers of people. Sudden liberalization would probably lead to factory closings and serious unemployment and, eventually, to a reversal of a policy goal that South Africa needs to pursue. A second option is to establish a free-trade regime for exporters in especially designated free-trade zones (also called export processing zones, or EPZs). The third option is to establish free-trade regimes for exporting activities while maintaining protected trade regimes for the domestic market. The second and third of these options are now explained.

Free-Trade Regime for Exporting Activities: This option is probably the most advisable for South Africa because it is the least likely to displace domestic production and the most likely to increase
employment from the start. The major instruments for granting free-trade status for export activities in an economy whose domestic market continues to be protected assume that South Africa maintains two important elements already in place, automatic import license and automatic access to foreign exchange for importation of raw materials, intermediate inputs, and capital goods to produce goods that generate export value-added.

**Free-trade zones (FTZs)** are special industrial areas devoted to the production of exports and located physically or administratively outside a country's customs barriers. Transactions in free-trade areas are not subject to tariffs and therefore escape delays and administrative costs associated with duty exemption and drawback systems. FTZs usually offer prepared and fully serviced land with easy access to port facilities and industrial plants: FTZs usually require considerable outlays for infrastructure.

FTZs have been tried in over 60 countries: they have been most effective in the early stages of an export drive as a means of attracting foreign investors and demonstrating a country's export potential. Accordingly, they have been more successful in countries that rely heavily on foreign investment. However, their relative importance tends to decline as the exports of other domestic industries expand.\(^{14}\) For South Africa, where there is already a well developed industrial sector and where domestic investment is likely to be more important than foreign investment, free-trade zones would not be a preferred solution.

**Bonded Manufacturing Warehouses (BMWs)** are similar to FTZs, except that the designated areas are smaller, usually encompassing only the facilities of one enterprise, and they can be located anywhere. The usual requirements for bonded warehouses are: the factory must be exclusively engaged in manufacturing commodities for export; the factory must have separate warehouses for the storage of imported inputs and finished goods; and customs officers must be stationed to inspect imported inputs and finished products.

\(^{14}\) Rhee, Yung Whee, *op. cit.*, p. 67.
BMWIs are advantageous for well-established, large-scale factories producing exclusively for exports. They are impractical for small-scale producers, indirect exporters, and for factories that produce for the domestic and export markets. There may be a case for using bonded warehouses in South Africa: if so, they should be an integral part of the solutions adopted to give exporters free access to imported inputs.

**Duty Exemption and Duty Drawback Systems:** South Africa already has a duty exemption and duty drawback system. In general, a duty exemption system exempts exporters from paying duties on imports used in export production. In its broadest form, a duty drawback scheme refunds exporters for import and indirect taxes paid on imported inputs. The more successful exemption and duty drawback schemes effectively give exporters free access to imported inputs and capital goods. The present South Africa programs are not designed for that purpose, but as an escape valve from protection and as a way of attenuating monopolistic practices; they do not give free access to imported inputs and capital goods. To give exporters free access to imported inputs and capital goods, the present systems under items 470.03 and 521.00 of the Customs and Excise Act need to be substantially modified.

Schedule 3 of the Customs and Excise Act contains the detail of rebates of ordinary customs duties on the importation of products used in the manufacture of goods for local consumption, in the industries specified in the schedule. In most cases the extent of the rebate is the full duty; in a few cases the rebate may be full duty less a percentage of import cost ranging from 3 percent to 20 percent, or full duty less an specific (rand) amount per unit of weight, volume or other product characteristic.

Industries affected by this provision are as varied and numerous as the products themselves, and include food industries, the mining industry, the chemical industry, and the textiles, plastics, paper and printing, industries which use base metals, machinery and mechanical appliances, and electrical equipment for several industries.
There are also rebates and refunds of excise duties on certain excisable goods used as raw materials for the production of other goods, which may not be themselves excisable. The list of goods eligible for rebate or refund of excise duties is contained in Schedule 6 of the CEA.

To obtain an exemption (rebate in South Africa), a South African exporter fills out a questionnaire at the nearest office of the Controller of Customs and Excise. If the Controller decides that the request has merit, it is forwarded to the Board of Trade and Industry. At that point, South African manufacturers of the purported inputs are afforded a first option to supply the goods at world prices. If the option is not taken up, or if the asking price is far in excess of the world price, the Board usually supports the application and issues an import permit within 14 days. In the Korean system such requests are decided within hours.

Applications for permanent duty drawbacks take at least six weeks. The Board usually supports applications if South African substitutes are not available, "or not economically available, or if the duty payable represents a significant burden and exemption thereof is necessary to improve the competitive position of the end product in the world market." Applications of merit are published in the Government Gazette to afford interested parties the opportunity to comment. Negative comments are forwarded to the applicant for reply. After at least six weeks, the Board considers the applications. If the Board decides to support the application, it asks the Government to modify the tariff schedule. Compared with the East Asian systems, where decisions are automatic and decided within hours, the South African system is glacially slow. In addition, because GEIS is a function of local content, exporters must choose between GEIS and duty drawback. By an overwhelming majority, they opt for GEIS.

What can be done? The duty drawback system needs to be thoroughly revised. South Africa needs a streamlined, automatic, duty drawback (or rebate) scheme explicitly independent of any

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suggestion that exporters should first shop locally for inputs. The most common type of duty drawback is based on a fixed system where the refund is estimated according to a preset schedule based on input-output coefficients. Successful duty drawback systems share the following characteristics: they guarantee free choice between imported and domestic inputs for both direct and indirect exporters; input-output coefficients are updated and published regularly to receive feedback from exporters and improve the quality of the coefficients; exporters are given a choice of instruments (individual or fixed drawbacks) there is close cooperation between the business community and the government to improve the technical coefficients and improve the system's administration. Simple and transparent tariff schedules go hand-in-hand with the more successful duty drawback schemes. Yung Whee Rhee's "Instruments for Export Policy and Administration," World Bank Staff Working Paper No.725, contains detailed descriptions of successful duty drawback systems.

GEIS: Administrative simplicity was a major reason for replacing the previous export support policies with GEIS. But now GEIS needs to be improved. First, GEIS is an imprecise way of offsetting South Africa's import duties. Analysis of the impact of GEIS on value-added by industrial sector (4-digit level of aggregation), suggests that GEIS overcompensates for import duties in 55 out of 77 cases and undercompensates in the rest. The variances between subsectors are enormous. Second, uncertainty about GEIS' funding and future is deterring exporters' long-term decisions. Interviews with South African exporters suggest that no exporter is willing to commit resources and enter export markets if the difference between profit and loss turns on GEIS. Third, as the South African government is fully aware, GEIS is a countervailable subsidy under the GATT. A successful export program based on GEIS would bring restrictive actions from the importing countries. Finally, GEIS is expensive--in 1990, two-thirds of customs revenues from manufactured goods were paid out as export subsidies. If import duties and export subsidies were simultaneously eliminated (and the exchange rate adjusted appropriately) the balance of payments impact would be zero, but there would be a net efficiency gain for the South African economy from elimination of the wide product-to-product variations in tax and subsidy rates. The first step is to give exporters access to inputs at world prices. This would address only half the source of anti-export bias -- the cost of inputs. The other half -- the higher price of output in the domestic market and
concomitant higher profits -- would remain untouched. How have other countries with similar levels of import protection overcome inherent anti-export bias and become successful exporters?

The key has been to condition access to other governmental support, and particularly to condition access to capital, to export performance. The Korean government conditioned its allocations of short and long-term capital (to produce for the domestic market and to produce for export) to export performance. Tax incentives were also conditional on export performance. As a result, production for the domestic market was a spin-off from production for export, not vice versa. Korean enterprises' decisions about capacity, and technology, were made with reference to what was needed to be competitive internationally rather than with reference to what would do in the protected domestic market. The enormous profits generated in the domestic market were reinvested in additional capacity.

Countries that attempted to follow a more classic infant industry strategy—achieve first the lax standards of the protected domestic market, then move on to export production from that base—were much less successful. Having installed capacity and technology that met only the local standard of competition, the owners of this capacity and technology—along with their workers—became an entrenched interest resisting adjustment to the more rigorous international standard.
REFERENCES OF ANNEX D


ANNEX E

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OF MANUFACTURED GOODS IN SOUTH AFRICA
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Annex E

Determinants of Exports and Imports of Manufactured Goods in South Africa

1. Introduction

South Africa historically relied on minerals as the main source of foreign exchange earnings. Manufacturing was driven by import-substitution and developed under high levels of protection. It tended to be focused on resource-based products needing little additional processing. The deterioration in mining and agriculture exports, coupled with their high capital-intensity, now make it urgent to renew emphasis on reorienting manufacturing to increase foreign exchange earnings and boost employment. Manufactured exports will be an important cornerstone of any future growth strategy. This note provides an overview of the salient characteristics of exports and imports of manufactured goods, investigates their empirical determinants, and examines the related policy implications.

Manufactured exports have increased in importance in the South African economy and in its trade account. They varied as a share of manufacturing output, and increased as a share of total non-gold exports until 1979. Between 1979 and 1984 they fell significantly. They recovered in 1985 and have increased rapidly since then, reflecting declining domestic demand (and the rand depreciation in 1983). Exports of manufactured goods have also increased in importance with respect to total exports—In 1960 manufactured exports accounted for 12.9 percent of total exports; by 1990 the share had become 46.4 percent.

The impact of trade policies is discussed in Belli (1993).

The paper does not explore the limitations of South Africa's trade statistics. The most striking of these is that export and import statistics refer to the SACU countries and not just to South Africa.
Empirical evidence supports the vent for surplus hypothesis (the increase in exports was partly in response to declines in domestic demand -- and accompanying low rates of capacity utilization-- and represented a substitution effect). Sharp depreciation of the rand immediately after 1983 made South African exports more competitive, and exporters responded to the change in relative prices (see Figure E.1). In the four industries in which capacity utilization fell the most pre- and post-1983 (beverages, other non-metals, electrical machinery, and other transportation), exports grew at an average of 19.8 percent annually. By contrast, exports grew at the average rate of 13.3 percent in the remaining sectors where capacity utilization fell by only 2.9 percent across sub-periods.

The manufacturing import-to-GDP ratio has fallen dramatically in South Africa since 1960. This can be attributed to massive substitution of domestically produced durable and non-durable consumer goods for imports. Despite the decrease, the ratio (which was 0.73 in 1990), is still extremely high compared to other low and upper middle-income countries. Imports of manufactured goods are clearly sensitive to relative prices (including the exchange rate) and income. An increase in the price of imports relative to domestic goods dampens the demand for imports. An increase in domestic incomes results in an increase in desired imports, all other things being equal. An additional important determinant of imports (particularly of capital goods) is the investment ratio. Since a large share of capital goods is imported in South Africa, an increase in the investment ratio is associated with a corresponding increase in imports. These have fallen as a result of three factors: import substitution of consumer durables, lower domestic demand, and the sharp depreciation of the rand in 1983. Econometric estimates generated high price and income elasticities over 1960-90. Figure E.2 illustrates the strong relationship between imports and relative prices (as measured by the ratio of import price to the GDP deflator).
Figure E.1: Manufactured Exports and Relative Prices

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Annex E - Determinants of Export and Imports of Manufactured Goods
2. Key Characteristics of Manufacturing Exports

Manufacturing exports have increased steadily in South Africa since 1972, with a noticeable acceleration in growth after 1983. Between 1972 and 1983 exports grew at an average annual rate of 3.6 percent (Table E.1). Between 1984 and 1990, the growth rate increased to about 10 percent (all in real terms). This performance is particularly impressive since it occurred during a period of financial sanctions. While export performance since 1983 has been respectable, allowing for the decline in mineral exports, manufactured exports will have to grow faster in the future to offset the terms of trade decline

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Footnote:

The South African definition of manufacturing is broader than the standard used by other countries.
in the mining sector. For the period as a whole, while production grew at 2.6 percent annually, exports increased at 6 percent. Consequently, the share of output exported grew from 7.2 percent in 1972 to 12.7 percent by 1990. This pattern held in almost all sub-sectors (the only exception being in food products, and printing and publishing). The strong performance of manufactured exports contributed to sizable current account surpluses in the mid- and late eighties.

At first glance it appears that the structure of South Africa's manufactured exports has changed very little since 1972. Overall export concentration has not fallen significantly. In 1972, the top five exporting sub-sectors accounted for roughly 62 percent of total manufacturing exports -- in declining order of importance: food, industrial chemicals, iron and steel, non-ferrous metals, and metal products. In 1990, the same five subsectors represented about 64.1 percent of the total. The top exporters have also remained unchanged -- the top five export sub-sectors in 1990 were the same in 1972, although iron and steel replaced food as the most important export. Despite the apparent stability in concentration, Table E.1 shows that traditionally small export sub-sectors grew rapidly in the 1980s, notably furniture, rubber and plastic products, non-metallic products, and other transportation equipment. Given the small base from which they started, however, growth in these subsectors did not change the export structure in a major way.

Three groups of sub-sectors contributed about two-thirds of the growth in exports from 1972 to 1990: basic metals and metal products (40.8 percent), chemicals (11.4 percent), and textiles and wearing apparel (9.3 percent). One remarkable contributor was jewellery which rose from a negligible percentage before 1983 to 5.8 percent between 1983 and 1990. Individually, the fastest growing sub-sectors were: furniture (20.4 percent) and wood products (13.1 percent), glass and glass products (14.5 percent), and beverages (12 percent). A sub-period breakdown indicates little change in the sectors contributing the most to growth over the period, reflecting the numerical dominance of the largest exporting subsectors.

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\( ^2 \) The export growth rate is even faster if one excludes the basic metals and chemicals industries (now a glut on world markets).

\( ^3 \) Much of the diversification took place before 1970 (see Black in Gelb[1991]).

\( ^4 \) This was caused by a misclassification of raw diamonds from mining to manufacturing.

\( ^5 \) Since their initial base was low, their export values are still small.
Exports grew faster in almost all sub-sectors after 1983 (more than doubling in many cases), especially in the small non-traditional exporters (furniture, glass and glass products, and other transportation equipment). It seems that the recession forced producers into the export market; small firms that relied heavily on the domestic market being particularly hard-hit. An examination of export shares and growth supports this hypothesis. In fifteen subsectors with export shares smaller than 5 percent before 1983, exports grew by 19.2 percent between 1983 and 1990. In contrast, more export-oriented sectors appeared better able to weather the decline in domestic demand and were more flexible in their response. Among the six subsectors with export shares greater than 10 percent, exports grew by only 9.4 percent between 1983 and 1990.

Attributable to low domestic demand and thus increased (vent-for surplus) exports from non-traditional sources, a marked increase in export orientation has taken place since 1983 compared to the earlier period (see Table E.2). The increase can be partly linked to the more depreciated rand between 1983 and 1986, and to a lesser extent, to the boom in world demand. It is less clear what part official export promotion and trade liberalization played. The progressive elimination of quantitative restrictions (QRs) and their replacement with lower tariff equivalents during the eighties probably contributed to export expansion by making imports available at lower cost. The increase in export orientation has been uneven across sectors. Table E.2 gives the details. The most export-oriented sectors such as jewellery, other manufacturing, and non-ferrous metals saw little change in their export shares. By contrast, other transportation equipment, glass and glass products, rubber products, other plastics and furniture all exhibited a surge in exports.

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1 Where "export orientation" is defined simply as the share of gross output exported.

2 While a set of export subsidies was in place during the early seventies we have no estimates of magnitude for each sector. The General Export Incentive Scheme (GEIS) and the sector-specific Structural Adjustment Programs (SAPs) have been too recently introduced for us to assess their impact.
**Table E.1: Exports in 1990 Prices**

<table>
<thead>
<tr>
<th></th>
<th>Average Growth Rate</th>
<th>% Of Total Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>3.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Food</td>
<td>1.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Beverage</td>
<td>7.1</td>
<td>19.6</td>
</tr>
<tr>
<td>Tobacco</td>
<td>6.6</td>
<td>13.7</td>
</tr>
<tr>
<td>Textiles</td>
<td>4.5</td>
<td>13.4</td>
</tr>
<tr>
<td>Wearing Apparel</td>
<td>10.5</td>
<td>12.2</td>
</tr>
<tr>
<td>Leather</td>
<td>5.9</td>
<td>-2.4</td>
</tr>
<tr>
<td>Footwear</td>
<td>8.8</td>
<td>13.1</td>
</tr>
<tr>
<td>Wood</td>
<td>15.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Furniture</td>
<td>18.8</td>
<td>22.9</td>
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<td>Paper and Paper Products</td>
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<td>10.1</td>
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<td>Printing and Publishing</td>
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<td>Industrial Chemicals</td>
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<td>7.8</td>
</tr>
<tr>
<td>Other Chemical Products</td>
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</tr>
<tr>
<td>Rubber Products</td>
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<td>Other Plastic Products</td>
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<td>23.8</td>
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<td>Pottery</td>
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<td>Other Non-metallic</td>
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<td>Basic Non-ferrous</td>
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<tr>
<td>Metal Products Excluding Machinery</td>
<td>4.1</td>
<td>5.2</td>
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<tr>
<td>Machinery and Equipment</td>
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<td>16.2</td>
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<tr>
<td>Electrical Machinery</td>
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<td>13.8</td>
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<tr>
<td>Motor Vehicles</td>
<td>0.6</td>
<td>14.9</td>
</tr>
<tr>
<td>Other Transport</td>
<td>4.4</td>
<td>13.6</td>
</tr>
<tr>
<td>Jewellery</td>
<td>2.8</td>
<td>20.4</td>
</tr>
<tr>
<td>Other Manufacturing</td>
<td>5.8</td>
<td>12.9</td>
</tr>
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</table>

Source: IDC Database, staff estimates.
<table>
<thead>
<tr>
<th>Export Shares</th>
<th>1972-90</th>
<th>1972-83</th>
<th>1984-90</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>8.48</td>
<td>7.36</td>
<td>10.39</td>
<td>41.3</td>
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<td>Food</td>
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<td>8.40</td>
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<td>Beverage</td>
<td>2.25</td>
<td>1.94</td>
<td>2.78</td>
<td>43.8</td>
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<td>Tobacco</td>
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<td>3.73</td>
<td>5.59</td>
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<tr>
<td>Textiles</td>
<td>8.46</td>
<td>6.08</td>
<td>12.53</td>
<td>106.0</td>
</tr>
<tr>
<td>Wearing Apparel</td>
<td>12.06</td>
<td>9.08</td>
<td>17.17</td>
<td>89.2</td>
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<tr>
<td>Leather</td>
<td>17.93</td>
<td>16.73</td>
<td>19.99</td>
<td>19.5</td>
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<td>Footwear</td>
<td>4.44</td>
<td>3.31</td>
<td>6.39</td>
<td>93.3</td>
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<td>Wood</td>
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<td>Industrial Chemicals</td>
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<td>10.16</td>
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<td>11.9</td>
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<td>Other Chemical Products</td>
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<td>4.06</td>
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<td>12.1</td>
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<td>Rubber Products</td>
<td>2.82</td>
<td>2.01</td>
<td>4.21</td>
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<td>Other Plastic Products</td>
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<td>0.45</td>
<td>1.04</td>
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<td>Pottery</td>
<td>1.23</td>
<td>1.10</td>
<td>1.45</td>
<td>31.7</td>
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<tr>
<td>Glass and Glass Products</td>
<td>6.10</td>
<td>3.09</td>
<td>11.27</td>
<td>265.1</td>
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<td>Basic Non-Ferrous</td>
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<td>38.30</td>
<td>11.7</td>
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<td>Metal Products excl. Mac</td>
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<td>2.97</td>
<td>3.85</td>
<td>29.6</td>
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<tr>
<td>Machinery and Equipment</td>
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<td>5.12</td>
<td>8.44</td>
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<td>Electric Machinery</td>
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<td>Motor Vehicles</td>
<td>2.48</td>
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<td>91.7</td>
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<td>Jewellery</td>
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<td>14.</td>
</tr>
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<td>Other Manufacturing</td>
<td>32.68</td>
<td>32.30</td>
<td>33.33</td>
<td>3.2</td>
</tr>
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</table>

Source: IDC Database, staff estimates.
Another striking characteristic of manufacturing exports in South Africa is the large proportion which is mineral-related. For example, base metals (iron and non-ferrous metals), metal products, and chemicals accounted for 56 percent of manufactured exports in 1972, and 58 percent by 1990. 73.2 percent of manufacturing exports were natural-resource-based in 1990. While this phenomenon is related to the country's physical endowments, it also reflects the generous incentives received by favored industries (such as the 37(E) and forward interest cover for exports). Commodity booms and resulting high prices over short periods during the seventies made production of base metals very attractive. However, continued reliance on mineral exports is likely to have adverse consequences for South Africa. Despite the seventies boom, world demand for base metals (and raw materials in general), has steadily declined since the first OPEC oil shock. Between 1972 and 1983, natural resource-based exports grew by 4.2 percent as against 2.4 percent for the rest of manufacturing. Between 1984 and 1990 however, while natural resource export performance was respectable, much faster growth was recorded in other subsectors (see Table E.3). The intermediate use of metals has dropped both relative to GDP and Gross Domestic Investment (GDI) globally since 1973. It is believed that higher energy prices spurred materials-saving technological improvements in the industrialized countries and that these improvements are likely to be permanent. Moreover, recession in the industrialized countries resulted in lower demand. Overall, the outlook for exporters of primary commodities is uncertain, given the intense competitive pressures arising from over-capacity.

A closer look at other mineral-related exports shows the growing importance of higher value-added mineral-related exports, namely metal products, machinery and equipment, electrical machinery, motor vehicles, and other transportation equipment.

\[\text{Natural-resource-based includes in addition to the mineral-related subsectors, food products and paper products.}\]

\[\text{For example, one of the most significant developments in steel use is the introduction of high strength low alloy steel (HSLA).}\]

\[\text{See Tilton, (1985) and Choe, Boum-Jong, (1991). Choe finds no evidence that the downswing in demand is a one-time improvement in the efficiency of raw material use. Neither does he find that cyclicality can completely explain the trend. Hoffman et al. extend the analysis to include the effect of economic restructuring on demand for raw materials. They find it an important explanatory factor especially in industrialized countries.}\]
### Table E.3: Export Growth

(per cent)

<table>
<thead>
<tr>
<th></th>
<th>1972-90</th>
<th>1972-83</th>
<th>1984-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beneficiated&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.7</td>
<td>5.3</td>
<td>8.9</td>
</tr>
<tr>
<td>Non-beneficiated</td>
<td>5.7</td>
<td>2.1</td>
<td>11.3</td>
</tr>
<tr>
<td>Natural-resource based&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.7</td>
<td>4.2</td>
<td>8.1</td>
</tr>
<tr>
<td>Non-natural resource</td>
<td>7.0</td>
<td>2.4</td>
<td>14.3</td>
</tr>
<tr>
<td>Metal products group&lt;sup&gt;c&lt;/sup&gt;</td>
<td>4.9</td>
<td>-1.3</td>
<td>14.6</td>
</tr>
<tr>
<td>Non-metal products</td>
<td>6.3</td>
<td>4.1</td>
<td>9.6</td>
</tr>
<tr>
<td><strong>Total manufacturing</strong></td>
<td><strong>6.1</strong></td>
<td><strong>3.6</strong></td>
<td><strong>10.0</strong></td>
</tr>
</tbody>
</table>

Source: IDC, staff calculations

Notes:

- **a/** Beneficiated: iron and steel, chemicals, and non-ferrous metals
- **b/** Natural-resource: same as a/ but including paper products and food products
- **c/** Metal products: metal products, machinery and equipment, electrical machinery, motor vehicles, and other transportation equipment

This subset of industries grew by 14.6 percent annually after 1983 compared to 9.6 percent for the rest of manufacturing. World demand has been increasing rapidly in this heterogenous category which South African manufacturers were able to exploit. The establishment of ARMSCOR probably generated a positive externality by increasing demand for the sub-group's products and introducing new technologies. An important characteristic of this category is their highly import-intensive nature. Their take-off could be related to the import liberalization of the eighties. Their high import requirements have implications for the future balance-of-payments position.
3. Empirical Analysis of Exports

We assume that demand and supply factors are relevant in determining the volume of goods actually exported each year. Exporting is carried out primarily in response to domestic demand conditions (\(D\)) as well as the price of exports (\(P_x\)) relative to domestic price (\(P_d\)) of output (or domestic cost factors). When incomes falls domestically, the resulting fall in capacity utilization forces firms to switch to external markets. A higher export price relative to what can be obtained locally makes exporting more attractive.\(^{12}\) In log-linear form the basic estimating equation is

\[
\ln(X') = \alpha_0 + \alpha_1 \ln D + \alpha_2 \ln(P_x/P_d) + \varepsilon
\]

where \(\varepsilon\) is a random disturbance term.

Due to difficulties with finding an accurate and continuous export price series, the exchange rate was used to represent the relative price variable. When the real effective exchange rate (measured in dollars per rand) is introduced directly, it is assumed to measure the relative probability of exporting. A depreciating exchange rate raises the domestic currency price of tradeables and makes it more profitable to export; conversely, an appreciating rate makes production for the domestic market more appealing. The following basic equation was estimated in log-linear form (data definitions can be found below the results in Table E.4):

\[
\frac{X}{Q} = \gamma_0 + \gamma_1 \frac{X}{Q(-1)} + \gamma_3 D + \gamma_4 \text{REER}
\]

The method of estimation used was Ordinary Least Squares (OLS). Results using Two-Stage Least Squares (2LS) differed from those obtained using OLS in that demand had a weaker effect. The dependent variable used was the share of gross output exported. Domestic demand pressures (or the lack thereof) were operationalized using an implicit capacity utilization variable derived by Fallon (1992) from

\(^{12}\) This is assuming that the South African export price differs from the world price because of the existence of subsidies and other measures.
### Table E.4: Empirical Results: Export Equations OLS Estimates

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**Data Definitions.**

- **X/Q** = Real exports of manufactured goods/Gross output (IDC database).
- **CU** = Inverse of deviation between actual and potential GDP (staff estimates based on CSS data).
- **WEXR** = Index of volume of world exports (IFS statistics).
- **WEXRD85** = Interaction term calculated as the product of WEXR and a post-1985 dummy variable (value of 0 before 1985, 1 after).
- **REER** = Real effective exchange rate (trade weighted and adjusted for inflation in trading partners) (US$/rand) (International Monetary Fund).
- **IRPXDP** = Index of relative prices: export price for manufacturing/domestic price for manufacturing (CSS, IDC).
- **DPMFG** = Domestic price of manufactured goods (IDC database).
- **IDXPMF** = Export price of manufactured goods (IDC database).
- **DUM76** = One-year dummy which takes the value 1 in 1976, 0 otherwise.
- **DUMEXR** = Exchange rate dummy which takes the value 1 in 1983, 0 otherwise.
the deviations of actual from potential output. A low capacity utilization rate deemed to indicate excess demand domestically is expected to be associated with an increase in the share of production which is exported. Capacity utilization was introduced with a lag. The simultaneity between export shares and capacity utilization was ignored. An examination of the disturbances indicated some autocorrelation. The introduction of a lagged export term to capture the fact that exports take more than one period to adjust reduced this problem.

The basic (and best) estimated export equation for the manufacturing sub-sector is presented in Column (1) of Table E.4. The sample period is 1972-89. All the variables are statistically significant and of the right sign. The vent-for-surplus hypothesis receives support. The estimates suggest that the secular decline in output has resulted in a substantial increase in manufactured exports. The estimated elasticity of export volume to domestic demand pressures is high (2.4). Domestic demand has a much stronger impact on the share of production exported compared to the other variables. The elasticity is well over one in different specifications. Exchange rate movements also have a statistically significant effect on the export share of production. The exchange rate elasticity is, however, smaller (0.63). World demand was either not significant or very weak. This is not surprising given that the bulk of the growth in South Africa's exports occurred in traditional exports such as iron and steel and chemicals, for which world demand was declining over the sample period. Consequently any substantial long-term expansion in exports will require a reorientation of exports towards products with more rapidly growing markets. World demand, while not significant over the entire sample period, does have an

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14 The level of capacity utilization in the manufacturing sector itself was also used successfully in the regressions. It was highly correlated with the Fallon capacity utilization variable.

15 The elasticity is calculated as \( \beta(1-\alpha) \), where \( \alpha \) is the coefficient of the lagged export term and \( \beta \) is the estimated coefficient of the variable.

16 However, the "symmetry" of this relationship needs to be investigated further. The sample period coincides with a protracted decline in output. It is not clear that an economic recovery would necessarily imply a reduction in exports of equal magnitude. For example, the entry and exit costs associated with entering foreign markets would dampen the fall in exports as domestic demand picks up again. An improvement in the export incentive structure would improve the overall supply response.

17 To obtain the effect of changes in output on exports directly, one would need to derive the effect of that output growth on capacity utilization i.e. \( \partial X / \partial Y = \partial X / \partial CU \cdot \partial CU / \partial Y \).
impact after 1985, perhaps reflecting the effect of sanctions. An interaction effect (the product of a post-85 period dummy and world demand as proxied by world trade) was weakly significant (t-statistic = 1.76) and improved the explanatory power of the model. It indicates that after 1985, world demand is a factor in the growth of South Africa’s exports.

Both 1976 and the 1989-1990 period are outliers. There appears to be a one-time drop in exports in 1976, perhaps related to cancellation of export orders as a result of social unrest. Column 3 presents the basic model without the year dummy for 1976 (1 = 1976, 0 = otherwise). Clearly, the overall fit of the model is improved when the dummy is included. Both exports and the export share are significantly higher in the 1989-90 period, and the estimated coefficients are not stable over that period; consequently, the model was estimated only up to 1989. There is also evidence of a partial adjustment story (that exporters take more than one period to adjust to the various price and income variables). The resulting coefficient is the net result of two factors: adjustment costs (+) and inventory effects (-). The positive coefficient on the lagged export term indicates that the adjustment effect dominated the inventory effect. The estimated model shows that the export response is rapid, with about 69 percent of export adjustment occurring in the first year, and the remaining 31 percent taking place in the second/next year. The introduction of the lagged dependent variable also reduces autocorrelation among the disturbances.

**Specification with alternative relative prices**

Column (4) of Table E.4 presents the alternative specification where the price of exports relative to the domestic price of manufacturing output was used in place of the real effective exchange rate. The relative price term was not statistically significant and had the wrong sign. It is possible that because the world demand variable (WEXR) is so highly col-linear with many variables (including the relative prices), it is essentially swamping the independent effects of the prices. There may be measurement problems with the relative prices used. (The export price was constructed by splicing five different export price series.) Standard errors in the variables problem would bias the coefficients towards zero. The relative

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1 It does not indicate that sanctions were unimportant. Some sub-sectors were hit harder than others.
prices were introduced separately, under the assumption that constraining the coefficients on each price to be equal might not be the correct specification. The result is presented in Column (5) and indicates that the coefficients remain statistically insignificant.

**Stability of the equations**

The introduction of slope interaction effects indicated slight changes in the slope of all the independent variables after 1988. However, in each case the magnitudes were small. But if we believe that the model is unstable after 1988/89, the coefficients for the earlier period may be more appropriate. The model was re-estimated using 1985, 1986, 1987, and 1988 as sample cut-off points. Four main points can be made (see Columns (1) to (4) of Table E.5): firstly, the exchange rate elasticity is very slightly stronger than the base case; secondly, the impact of domestic demand pressure is strengthened; thirdly, slightly more export adjustment occurs in the first period in 1985-88 compared to post-1988; fourthly, world demand is still not an independently statistically significant determinant of the export share in the earlier years. Overall, the equation is extremely robust over the selected sub-periods and the statistical significance of all variables is strengthened.

In addition to the level of capacity utilization, it seems that the rate at which that level changes should be an important factor in the overall level of exports supplied (due to bottlenecks, costs of adjustment and so on). Thus a new term was introduced (DELTACU), calculated as the logarithm of the ratio of current to lagged capacity utilization. The resulting equations are attached as (9). They do not support a dynamic role for capacity utilization; the level of capacity utilization remains the more important determinant of exports.

Dummies were introduced to check for regime changes after the 1983 devaluation (both one-time and post-1983), sanctions (post-1985). These are very crude and, not surprisingly, did not behave consistently.
Table E.5: Export Equations Revisited

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<td>(3.07)</td>
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<td>-0.13</td>
<td>-0.12</td>
<td>-0.12</td>
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<td>(3.21)</td>
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</table>

Source: Staff estimate
4. Empirical Analysis of Imports

Imports of manufactured goods have been strongly influenced by investment and exchange rates, and by the pattern of industrialization. Between 1960 and 1975, imports grew by 7.1 percent on average each year, corresponding to a period of rapid manufacturing output and investment growth associated with the import-substitution strategy which was sustained by a complex system of tariff protection. In addition, the period was marked by buoyant gold prices. Since 1975, however, imports of manufactured goods have declined in most years, reflecting the secular decline in output. The exceptions are the years immediately following the resurgence in gold prices (1978-80). The decline is particularly noticeable after 1981 (the beginning of a mini-recession), and in 1983 (in reaction to the sharp rand depreciation that year). Between 1981 and 1991, imports declined by 3.1 percent on average each year.

In addition to its overall decline, the composition of imports has also changed as a result of the import-substitution policy. In 1960, consumer goods such as textiles accounted for a major share of all manufactured goods imports. By 1980, they had decreased in importance as a share of total imports as domestic production of these goods increased. In contrast to consumer goods imports, imports of capital goods increased in importance over time. This was particularly noticeable during the mid-seventies; the share of capital goods imports in the total reached a peak of 40 percent in 1970 before falling to about 31 percent in the mid-eighties. The increase resulted from the capital requirements of large capital-intensive (mostly public-sector) investments made in iron and steel and industrial chemicals during the seventies. Individually, the fastest-growing imports have been chemicals, and paper and wood pulp imports, reflecting the expansion of SASOL and SAPPI respectively.

An examination of trends in output and import growth rates in manufacturing (Figure E.3) indicates that the import intensity of growth increased in the eighties (shown by closer correlation in the movements between the two). Certainly, the short-term (year-to-year) relationship between the two series is strong over most of the period. A scattergram of the two series fitted with a regression line showed a highly positive correlation. The difference between the two (which we refer to as the import intensity of growth) is dominated by movements in imports (which have fluctuated much more widely than GDP).
The figure suggests that import intensity increased most dramatically in the 1980s. However, it is more likely that this simply represents changes in the composition of imports. Past import substitution policy reduced imports of consumer goods and increased the share of intermediates and capital goods in the total. This had the effect of making output much more responsive to the total level of manufactured imports.

**Figure E.3: Import and Output Growth Trends**
A traditional import demand function is specified in which it is assumed that demand is primarily driven by price and income. Thus, the basic equation estimated is a variation of:

\[ M = c_0 + c_1 \text{REER} + c_2 \text{GDP} + c_3 \text{DUMEXR} \]

where, \( c_1, c_2 > 0 \) \( c_3 < 0 \).

- \( M \) = real imports of manufactured goods\(^{126}\)
- \( \text{REER} \) = real effective exchange rate (US$/rand)
- \( \text{GDP} \) = gross domestic output in constant 1985 prices
- \( \text{DUMEXR} \) = dummy variable which takes the value 1 for 1983 (year of exchange rate shock) and 0 otherwise

Additional variables included in some runs were:

- \( \text{DUM86} \) = dummy variable which takes the value 1 for 1986 (year import surcharge introduced) and 0 otherwise

The basic equation is Column (1) of Table E.7. This has been corrected for autocorrelation. Both income and exchange rate elasticities are high and well above one. All coefficients are statistically significant with the right sign, and the fit of the equation is good. A one-year dummy (1983) was found to be highly significant and negative (Column 2). This may represent the fact that the huge devaluation that year took economic agents by surprise. In subsequent years, expectations adjusted and agents were better able to anticipate the exchange rate path. There is no evidence that the import surcharges introduced in 1986 to reduce import demand had an effect. Neither a one-year or period dummy for 1986 had an effect on the level of import demand (Column 3).

\(^{126}\) The import series was obtained from the CSS data base and an import price series was derived by splicing several price series for different time periods. The advantage of the import series was that a long time period (thirty years) could be used. A disadvantage was that the imports in this series are not South Africa proper but rather the South African Customs Union (SACU); thus it includes the BNLS countries. The Industrial Development Corporation (IDC) also has an import series. This was only available for a much shorter time interval (1972-90).
Table E.7: Import Demand Functions  
(Sample period: 1960-90)

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Source: Staff estimate
There was evidence that imports respond to exchange rate changes with a lag. Both the last and current period exchange rate influenced the level of imports with the two effects being about equal (Column 4). In addition to the level of national income, the rate of growth in manufacturing was an important determinant of imports. A 1 percent increase in the manufacturing output growth rate results in a 1.3 percent increase in import requirements. This term may be capturing the fact that it is not just the level of income, but the rate of change that determines imports. Perhaps it is easier and less costly for manufacturers to find domestic substitutes when output growth is slower. Finally, an investment term was introduced to capture the impact of investment rates on import demand (Column 6). The import content of investment is quite high in South Africa. The term is highly significant and of the right sign. A 1 percent increase in the investment ratio is associated with a 0.5 percent increase in imports.

There has been some structural change in the parameters of the model. Up to the mid-seventies, imports appeared to income-driven while during the eighties, price (in the form of the exchange rate) was much more important. Both simple correlations and regression estimates supported this.

5. Conclusions and Policy Implications

The export results show that the domestic demand elasticity exceeds the prices elasticity. On the face of it, that the domestic demand effect dominates the price effect does not bode well for South Africa’s balance of payments in the short-run given a recovery in domestic output. Our analysis predicts a deterioration in the current account. However, offsetting factors will temper the effect of a domestic demand expansion on exports and lessen the deterioration in the current account. It is by no means certain that exports as vent-for-surplus behaviour is symmetric -- for instance, if there are significant investment costs associated with entry in export markets these costs will prevent a 100 percent switching back in an economic recovery. Belli (1993) showed that despite trade-liberalizing actions in the eighties, the system of protection in South Africa still constituted an effective anti-export bias. If the overall export incentive framework improves then export supply response should be larger. In the short-run, implementation of a streamlined and effective duty drawback would contribute to reducing some of the
existing anti-export bias recorded in the sector. In the long-run, removal of excessively high levels of protection allows exporters to obtain their inputs at world prices and forces them to be more competitive. Finally, if domestic expansion is accompanied by a larger scale of production, and if South Africa were to form some regional alliance (in a free-trade zone) allowing it access to the countries of the region, then average costs would be reduced, making South African exports more competitive. On the positive side, the results indicate that exchange rate policy can be an effective tool to stimulate exports. This appears especially true for the fast-growing exports in the engineering and metal products categories. In addition, imports also respond to relative prices. While the income elasticity suggests that a resurgence in demand will be accompanied by sizable import requirements, rationalization of tariffs should contribute to more realistic prices and more efficient use of imports.

Areas for future research could include detailed sub-sectoral studies on the fast-growing non-traditional export sectors. Who are these firms? What is their viability as independent operators? Are they truly new, or are they firms set up for import substitution and forced to turn into export markets? Have firms in these sub-sectors found a niche or is their performance linked to special domestic incentives? How competitive are these firms on the world market? Are they competing on price or quality? How sustainable is their export drive? What lessons can be drawn from their experience for other potential export catalysts? What is the effect of wages as a cost factor in the development of exports?
REFERENCES OF ANNEX E


