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ABSTRACT

This paper sets out to identify, describe and seek causes for South Africa's growth revival since 1994. Following an analysis of the initial conditions for an economic recovery in 1994, growth accounting is used to distinguish the relative contributions of capital, labour and total factor productivity to this growth revival at the aggregate, sectoral and sub-sectoral (for manufacturing) levels. There is a substantial South African literature on the evolution of capital, labour and productivity which is combined here with the empirical evidence of the last decade to judge the potential contribution of these factors to the growth recovery. This paper finds that openness (to trade and capital flows) and a stable macroeconomic environment (partly attributable to policy) have been leading causes of South Africa's growth recovery.

Keywords: Growth, South Africa

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South Africa's growth revival after 1994

1. INTRODUCTION

South Africa's democratic transition in 1994 created expectations of a significant turnaround in economic performance. Trade and financial sanctions and internal political opposition to the apartheid government had contributed to the poorest ten-year growth performance since the Second World War and the removal of these constraints was widely expected to transform the country's economic performance (De Wet, 1995). One could also argue that rising prosperity was needed to sustain the political transition. In the event, the decade since 1994 did see an improved growth performance in South Africa, particularly when compared to the previous ten years. However, the improvement was modest, on average, both by international standards and the standard of South Africa's own history.

¹ Department of Economics, University of Stellenbosch. This paper was prepared for the conference "Economic policy under democracy: a ten year review" held in Stellenbosch on the 28th and 29th October 2005. We are grateful for the comments and suggestions by the conference participants, especially Janine Aron but also John Muellbauer and three referees. The responsibility for remaining errors rests with the authors.

This paper sets out to identify, describe and seek causes for South Africa's economic recovery since 1994. It starts with a description of the economic recovery in section 2, though the main body of the paper starts with section 3 where the initial conditions for an economic recovery are evaluated using local and comparable international data. Growth accounting is then used to distinguish the relative contributions of capital, labour and total factor productivity to this growth revival at the aggregate, sectoral and sub-sectoral (for manufacturing) levels. In this regard the paper contributes to the existing literature in two ways: at the aggregate level the paper considers a wider range of measures for the contribution of labour than in existing studies using data of a recent vintage, while at sectoral level the paper contributes an analysis of developments since 1997.

The paper proceeds in the fourth section with a consideration of potential causes for the relative contribution of capital, labour and productivity. The purpose is to identify those underlying causes that would explain the relative contributions by these factors of production and in that way build an explanation for the economic recovery in South Africa since 1994. There is a substantial South African literature offering analyses and explanations for the evolution of capital, labour and productivity and this literature is combined with the empirical evidence of the last decade to judge the potential contribution of these factors in the growth recovery. However, the literature is based on earlier samples of South African data (overlapping at best for a few years with the period since 1994) and many of the causes that evidently operated earlier do not help to explain more recent trends. Three factors which operated earlier, have also been important more recently as causes of South Africa's growth recovery though, i.e. openness (to trade and capital flows), lower interest rates and reduced uncertainty associated with stable macroeconomic policies and a successful political transition.

2. TRENDS IN ECONOMIC GROWTH SINCE 1994

The performance of the South African economy fluctuated considerably in the post-War era, but particularly since the early 1980's. This is illustrated in figure 1, which shows the level of real per capita GDP from 1960 to 2004. Two trends stand out: firstly, the decline in real per capita GDP since 1981 and, secondly, the growth revival since 1995. The focus of the paper is on the "revival" (i.e. 1995 – 2004), but the decade of "decline" (i.e. 1985 – 1994) is also discussed briefly in this section to provide the immediate context of the subsequent "revival".

South Africa's real economic growth rate averaged 3.1 percent (1.1 percent in per capita terms) during the period 1995 – 2004 (see figure 2). This represented a substantial improvement on the 0.8 percent average growth rate (-1.3 percent in per capita terms) registered in the decade from 1985 – 1994. Although this was a welcome improvement, South Africa's growth performance remained relatively low by world standards.²

Figure 1 about here

Figure 2 about here

South Africa's improved growth performance also appears to be gathering pace: the average growth rate for the first five years after 1994 was 2.6 percent followed by a 3.6 percent average in the second five years. However, it is difficult to identify this performance with a change in the long-run growth potential of the economy, as the recovery has also been co-extensive with the longest post-war upswing of the South African business cycle. In 2005 the growth rate increased to 5.1 percent and forecasters are generally optimistic that the growth rate will remain above 4 percent (on average) for the next few years (for example, Laubscher, 2006).

In order to consider the nature of this improvement in South Africa's growth performance the behaviour of the various components of the overall GDP may be considered. The sectoral distribution of total production for the period 1984 to 2004 is presented in table 1 both as ratios to GDP and in terms of average growth rates for the two decades.

Table 1 about here

The table reveals some noteworthy characteristics of the pattern of South Africa's growth over the past two decades. The most striking feature is the sustained rise of the tertiary sector relative to the rest of the economy,

² In the decade since 1994 the regional per-capita GDP growth rates for sub-Saharan Africa and Latin America were 1.1 percent and 0.8 percent respectively, while South Asia (with 3.7 percent) and East Asia (with 6.2 percent) did considerably better (Rodrik, 2006: 2).

accounting for a more than proportionate share (78 percent of GDP) of growth since 1994, as it had done in the preceding decade (94 percent of GDP growth between 1985 and 1994). The fastest growing individual sub-sectors since 1994 (both in the tertiary sector) were transport, storage and communication and financial intermediation, insurance, real estate and business services. Meanwhile, manufacturing contributed less than proportionately to growth in both decades, but especially in the decade before 1994 during which time its share of GDP declined from 23 percent in 1984 to 20.9 percent in 1994. Manufacturing grew at 2.7 percent in the decade after 1994 and provided 16.3 percent of the growth in real GDP since 1995, but still declined as a proportion of total output. The primary sector (at an average growth rate of 0.5 percent) provided the smallest contribution to the growth revival since 1994 (the mining and quarrying share of GDP declined from 12.7 percent in 1984 to 7.0 percent in 2004 and agriculture, forestry and fishing from 4.8 percent to 3.1 percent).

Table 2 provides basic data about investment in the South African economy over the last two decades, including the average growth rate of investment over these periods and the division of investment by type of organisation, by type of asset and by type of economic activity. Expenditure on fixed investment in South Africa improved sharply in the period 1995 – 2004 compared to the previous ten years. Despite this improvement, however, fixed capital formation (as a percentage of GDP) was only 16.2 percent in 2004 (up from 15.2 percent in 1994) and remains low by international standards and also relative to what is required for sustained high real GDP and employment growth rates.

Table 2 about here

Table 2 shows two striking trends in the data: first, the sharp increase of private investment expenditure in total investment expenditure in contrast with the declining share of government investment expenditure. Second, investment in machinery and equipment is not only the largest category of investment by type of asset but also the most rapidly growing.³

International capital flows are of great importance for the South African economy due to a long-standing mismatch between domestic saving and domestic investment as is shown by the data in table 3, while table 4 shows the data for foreign capital inflows associated with the imbalance between domestic saving and investment.

Table 3 about here

The data in table 3 reveals a number of interesting features of savings behaviour in South Africa. Firstly, the bulk of domestic saving (other than the provision for depreciation allowances) is provided by the corporate sector. Secondly, household saving has declined from 3 percent of GDP in 1985 – 1994 to less than 1 percent in 1995 – 2004. Thirdly, the government continued to dissave at a rate of between 3 and 4 percent of GDP. Fourthly, total gross domestic saving has declined from more than 20 percent in 1985 – 1994 to 15.5 percent in 1995 – 2004. Given the stable gross capital formation ratio this implies, fifthly, that foreign saving has swung around from a negative GDP ratio of 2.5 percent of GDP in 1985 – 1994 to a positive 2.4 percent in 1995 – 2004.

Table 4 about here

3. UNTANGLING SOUTH AFRICA'S ECONOMIC GROWTH SINCE 1994

3.1 *Initial conditions in the early 1990s*

That South Africa had, at one time, possessed not only the potential for catch-up growth, but had to an extent realised that potential is a matter of historical record: by 1900 the economy had developed sufficiently for it to be a likely member of the international “convergence club” in Dowrick and DeLong’s (2005) reckoning. Though the average per capita growth rate was unspectacular (on an international comparison) during the 1913-1929 period, economic growth accelerated to an impressive rate of 3.8 percent per capita (on average) between 1929 and 1950. During this period South Africa’s per capita growth was amongst the fastest in the developing world and much higher than the growth rates of the leading industrialised economies. However, on a per capita basis (and relative to the international sample used here) South Africa’s economic growth was unimpressive throughout the post-

³ Classified by type of economic activity, the largest categories are fixed investment in the financial (24.5 percent in 2004) and the manufacturing (20.1 percent in 2004) sectors. The most rapidly growing sectors are construction and transport, storage and communication.

War era and the economy gradually left the “convergence club” in Dowrick and DeLong’s (2005) judgement.

Figure 3 about here

This long-run relative decline of South Africa’s economic performance is demonstrated graphically in figure 3, a box plot of the per capita GDP relative to USA per capita GDP for the countries in a comparative sample for the periods indicated using the data reported in Appendix A⁴.

Three trends stand out in this graph. First, there are only two intervals on this graph during which South Africa gained both against the USA and relative to the peer group, i.e. a modest gain between 1970 and 1980 and a more substantial gain between 1913 and 1950. Second, South African per capita GDP stagnated relative to the USA since the fifties and declined since 1980. Third, the international peer group gained against the USA during the fifties and sixties, so that South Africa’s per capita GDP fell back within the international group even while it kept pace with the USA.

In addition to the long-term pattern of economic growth, proxies for the development of human capital, the fertility rate, access to public services, income inequality, the export share in GDP and the share of manufactured goods within exports, provide further information about the initial conditions for economic recovery in South Africa by 1994. Figure 4 compares the initial conditions for South Africa along these dimensions with the median value for a peer group of developing countries in 1994.

Figure 4 about here

The male and female literacy radii show the adult literacy rate for both sexes as a percentage of the total population and the radii for primary and secondary school enrolment show the percentage of the school age population enrolled at these school levels. While only the male literacy rate amongst the education radii show South Africa in an unfavourable light against the group by 1994, the South African score on all these measures hide very considerable between (racial) group variation. Also the South African male literacy rates were substantially lower (at 82 percent) than those countries in the dataset closest to South Africa in terms of per capita income in 1994, Argentina (96 percent), Mexico (92 percent) and Venezuela (92 percent).

The education legacy of apartheid was not only lower educational attainment for the black and coloured groups, but also a between group quality gap. For example, in the year 2000, 55.6 percent of all matriculants passed their higher grade mathematics exam, while only 15.3 percent of black pupils passed the same exam (Van der Berg, 2005). Furthermore, the average pass rates hide the acute problem of poor quality education in South Africa. On the Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) comparative test of reading and mathematics for grade six learners, South African learners ranked on average 8th and 9th out of 14 countries for reading and mathematics respectively (Van der Berg, 2005). The relatively poor performance on mathematics is especially disconcerting given the important synergies between mathematical ability in human capital and productivity (see 4.1 below).

The relative fertility radius in figure 4 shows the total fertility rate for each country as a proportion of the fertility rate in Nigeria (the highest in the peer group at 5.6). At the time of its political transformation, South Africa still had a higher fertility rate than the median for the peer group (as well as notably larger than the sub-group of Argentina, Mexico and Venezuela), which added to the demographic pressure on the labour market, where labour market participation expanded dramatically (see 4.3 below), and on the poor rural regions.

The inequalities of South African society at the time of the political transition are more clearly visible along the Gini coefficient radius in figure 4: South Africa and Brazil had the most unequal income distributions in this sample by the mid-nineties. However, severe inequality does not distinguish South Africa from the comparable group of countries in terms of GDP per capita, Argentina, Mexico and Venezuela. Extreme inequalities such as these raise the risk of social instability or, as Aron and Muellbauer (2005) observed it raises the risk to capital and

⁴ To judge the trajectory of the South African economy leading up to 1994 a counterfactual experience is required and an international comparison is one way of creating such a counterfactual. To that end we combined the groups selected by two leading sources on the comparative economic performance of the South African economy, i.e. Moll (1991) and Feinstein (2005) (the combined set of 33 countries is shown in Appendix A). Both authors collected a set of market economies that were broadly comparable at the start of the First World War which represents the historical point from where we trace the economy’s evolution.

income of future redistributive taxes and transfer payments. The provision of public services in South Africa, as proxied by the 70 percent of the population with access to safe water in 1995, though similar to that of Brazil (72 percent), fell short of the similar provision in Mexico (83 percent) and Venezuela (79 percent), even if the relevant radius in figure 4 suggests that the South African situation was typical for the peer group.

Finally, the proportion of export and manufacturing share of exports radii in figure 4 show that the South African economy was not out of step with this peer group where either the export proportion or the manufacturing share of exports was concerned. Furthermore, South Africa had a much higher export share than Argentina or Mexico (though not Venezuela). Rodrik (2006) also observed this relatively auspicious position for exports in the early nineties; he found a comparison between South Africa and Malaysia in 1988 suggestive.

With the exception of the promising position of exports, the conditions for a rapid turnaround in economic growth were inauspicious in 1994: not only had the economy long been in relative (and ultimately absolute) decline but had fallen further behind in the productive employment of capital and labour; the attainment and quality of education varied greatly between racial groups; the same racial variation lies behind the unfavourably large fertility rate by 1994; while the Gini coefficient (for income) and proxy for the provision of public goods summarise the many inequalities at the time which (as human capital) presented a continuous economic burden, but also posed a longer term social and economic threat to the stability of the New South Africa.

3.2 Growth accounting

To explain South Africa's economic growth over the past ten years, a first step is to identify the relative contributions of the major factors of production (capital and labour) and overall productivity. Such an exercise focuses on the proximate, rather than the more fundamental causes of growth and is based on standard growth accounting which provides a means of allocating observed total output growth between the contributions of the changes in factor inputs and total factor productivity (TFP).

The methodology on which the standard growth accounting exercise is based may be described as follows (Barro, 1999; Bosworth and Collins, 2003). Assuming a constant returns to scale production function:

$$Y = AK^\alpha(LH)^{1-\alpha} \quad (1)$$

where Y = total output, K = capital stock, L = employment, H = average human capital measure, A = total factor productivity (TFP), α = output elasticity of capital and $1 - \alpha$ = output elasticity of labour.

The growth rate in output can then be decomposed into components associated with factor accumulation and TFP. Differentiate the equation above with respect to time (assuming Hicks neutral technology) and divide by Y, yielding:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \alpha \left(\frac{\dot{K}}{K} \right) + (1 - \alpha) \left(\frac{L\dot{H}}{LH} \right) \quad (2)$$

Assuming perfect competition, α (and $1 - \alpha$) can be estimated by the share of capital (labour) in total income. The growth rate of TFP (i.e. $\frac{\dot{A}}{A}$) can then be derived, given time series data on Y, K and LH.

In decomposing South Africa's economic growth performance over the past ten years three alternative measures of the labour factor are utilized: (i) assuming no contribution of changes in average human capital, i.e. $H = 1.0$ in equation (1) above; (ii) measuring changes in average human capital on the basis of the average years of schooling of the South African labour force, i.e. $H = (1.07)^S$ where S = average years of schooling and assuming a seven percent return to schooling for each year (Bosworth and Collins, 2003); and (iii) disaggregating employment into three categories of skills levels (highly skilled, skilled and semi- and unskilled), each weighted with its respective shares in the total wage bill (Fedderke, 2002). The relevant data are presented in table 5 below⁵.

⁵ An important caveat should be made at this point: labour market time series in South Africa should be used with caution as both the institutional environment of the labour market and the method of collecting the data changed significantly over time (Banerjee, Galiani, Levinsohn and Woolard, 2006). The same caution translates directly to the use of labour market time series in growth accounting as presented here. To the extent that the informal sector is underestimated in the labour series but captured in output, growth accounting risks overstating the contribution of TFP growth. Unlike the Labour Force Survey data (see, for example Burger and Yu, 2006), however,

Table 5 about here

Table 6 below shows the results of the growth accounting exercise and reveals the important role of multifactor productivity in South Africa's economic growth performance over the past 2 decades. In the ten years after 1994, productivity growth was the major factor in the growth revival⁶, which contrasts sharply with the negative contribution to growth by productivity in the ten years before 1994. Though modest the contribution of capital to growth was slightly higher since 1994 than in the preceding decade, while labour's contribution declined, though it remained positive. Labour's contribution is higher in rows 3 to 6 suggesting that improvements in average human capital during this period had a positive, though modest, impact on growth via labour (see also, Fedderke, 2002)

Table 6 about here

Recent studies on South Africa's growth performance, Fedderke (2002) and Arora (2005), also highlighted the sharp turnaround in the contribution of multifactor productivity. Their results are summarised in table 7 below.

Table 7 about here

The results in tables 6 and 7 pertain to the overall growth performance of the South African economy. Additional information on the proximate causes of South Africa's growth revival may be gained by a similar analysis of the various individual production sectors and sub-sectors⁷. Tables 8 and 9 shows the results of growth accounting for the main sectors of the economy (table 8) and the manufacturing sub sectors (table 9).

Table 8 about here

The results of the sectoral decomposition of South Africa's growth performance over the past two decades suggest the following broad conclusions: (i) that multifactor productivity dominated capital and labour as positive proximate causes of the growth revival in the decade since 1994; (ii) while capital also contributed positively since 1994, the growth rate of the labour input (in the formal sector) declined (except for two of the tertiary sub-sectors: wholesale and retail trade and financial intermediation); and (iii) the contribution of multifactor productivity was most pronounced in the secondary and tertiary sectors. The positive contribution by TFP in manufacturing since 1994 contrasts with the negative contribution by TFP during the nineties found by Fedderke (2002). Since Fedderke's (2002) sample for the nineties did not run beyond 1997, the contrasting results suggest that the contribution of TFP growth to the growth revival gathered strength as the decade starting in 1995 unfolded. Finally capital accumulation contributed most to growth in the construction and services sectors.

Table 9 about here

4. THE EVOLUTION OF CAPITAL, LABOUR AND PRODUCTIVITY

In this section we combine lessons from the growth literature on South Africa with empirical evidence from the period under consideration to identify likely explanations for the relative contributions of investment and labour and productivity to growth in South Africa from 1995 to 2004. This method runs into a basic problem, i.e. the sample under consideration here overlaps at best for a few years (and sometimes not at all) with the samples used to examine the various drivers of economic growth in South Africa. This method requires the assumption that the systematic relationships driving capital, labour and productivity did not change fundamentally between the estimated sample and period under consideration.

4.1 Explaining TFP growth

it is not possible to determine whether the Quantec data used here systematically over- or understate employment.

⁶ South Africa's TFP growth was also relatively high by world standards - Bosworth and Collins (2003) found that during the period 1990 – 2000 total factor productivity for the world economy (as measured by 84 countries considered in their study) increased by 0.8 percent per annum. The comparable number for the 19 African countries considered in the Bosworth and Collins study was –0.5 percent.

⁷ The results at the 3-digit sub-sectoral level should be interpreted with caution as the derivation of 3-digit data from data compiled at the 2-digit level using the infrequently updated input-output data available for South Africa risks missing sectoral shifts and could misrepresent the correct contribution of the various factors (Fedderke, 2002).

The observation that TFP accounts for the bulk of the growth raises the question of explaining the rise in TFP growth. To identify the factors that have influenced TFP in South Africa it is, however, first necessary to give theoretical content to TFP growth: TFP growth might, for example, result from spill-over associated with capital investment (Romer, 1986), or from spill-overs associated with investment in human capital (Lucas, 1988) and yet a third alternative is that TFP growth might be due to explicit investment in research and development, often called Schumpeterian TFP growth (Fedderke, 2005).

Fedderke (2006) proposed an econometric test for the relative importance of the two types of spill-over effects on TFP growth in the South African experience and the presence of Schumpeterian effects, using a panel data set of manufacturing sectors for the period 1970 to 1997. The study used a dynamic panel model with TFP as the dependent variable and a range of explanatory variables that might help to identify the various types of TFP growth, including growth in the capital stock for Romer-type spill-overs and human capital proxies for Lucas-type spill-overs.

Fedderke's (2006) results indicated no evidence of Romer-type spill-overs and only modest evidence of Lucas-type spill-overs associated with human capital proxies such as the proportion of matriculants taking mathematics and science and the proportion of university degrees awarded in the natural, engineering and mathematical sciences. There was, however, evidence of Schumpeterian effects on TFP, notably a positive effect from research and development (R&D) and from proxies of human capital investment. The human capital proxies that proved significant are those that offer some measure of the "quality" as opposed to the "quantity" of human capital (Fedderke, 2006).

Fedderke (2005) has identified the "core determinants" of TFP growth in SA with the combination of these factors that determine the quality of human capital development and those determining R&D activity. This is a strong interpretation of the results given that they were derived with data for the manufacturing sector alone (representing only 20 percent of GDP). The generalisation of results from manufacturing to the entire economy is particularly difficult where TFP is concerned since, on Fedderke's calculation elsewhere, the contribution of TFP to growth at the sectoral level was notably negative for manufacturing during the nineties while positive in services, mining and agriculture (Fedderke, 2002)⁸. These "core determinants" had shown marked declines in the quality of education and in R&D activity up to the democratic transition (Fedderke, de Kadt and Luiz, 2003a) and Van der Berg has shown that this decline has continued through 2001 where the quality of human capital development is concerned (Van der Berg, 2005). This suggests that the "core determinants" of TFP growth, as identified, cannot account for the rise in TFP growth observed across many sectors in the economy since 1994.

The renewed interest in potential Schumpeterian effects on TFP growth has led the international literature⁹ over the last decade to re-consider the potential relationship between competition and innovation previously studied by, for example, Scherer (1967). While the theoretical literature (e.g. Dixit and Stiglitz, 1977) suggests that competition might depress innovation¹⁰, the empirical literature (e.g. Nickell, 1996) has found evidence of a positive relationship between competition and innovation. Aghion, Bloom, Blundell, Griffith and Howitt (2005) have recently suggested a new model which predicts an inverted U-shape for the relationship between innovation and competition which is consistent both with their own empirical evidence (from a panel of listed UK firms from 1973-1994) and with the positive relationships found by empirical studies based on linear regression models¹¹. This prediction was also confirmed for manufacturing firms in South Africa by Aghion, Braun and Fedderke (2006).

The potential impact of product market imperfections has also received some attention in the recent South African literature. First, Fedderke, Kularatne, and Mariotti (2007) quantified the extent of competition (or the

⁸ As mentioned above, this contrasting experience of manufacturing (found with data up to 1997) does not show up in the data for the period 1995-2004.

⁹ Recent international papers include those by Nickell (1996), Blundell, Griffith and Van Reenen (1999) and Aghion, Bloom, Blundell, Griffith and Howitt (2005).

¹⁰ This negative relationship between competition and innovation is also consistent with the endogenous growth models of, for example, Romer (1990) and Aghion and Howitt (1992), where competition reduces innovation by lowering monopolistic rents. However, Nickell (1996) is right to observe that the theoretical literature also contains models predicting a positive effect for competition on innovation working through sharpening the incentives for managers, or perhaps by increasing the response of profitability to managerial effort, or by encouraging greater effort by workers who share in rents.

¹¹ The peak of the inverted-U (in terms of the measure of competitiveness) lies close to the median of Aghion et al.'s (2005) sample. With a median of 0.95 (where 1 means perfect competition) this data would yield a positive linear relationship between the measure of competitiveness and innovation.

lack thereof) in a panel of 3-digit South African manufacturing industries by using the technique of Roeger (1995) to calculate mark-ups of price over marginal cost. In calculating these mark-ups Fedderke et al. (2007) control for a number of potential determinants of the mark-up (the business cycle, import and export penetration, market structure and industry competitiveness) and they use the dynamic heterogeneous panel estimation technique of Pesaran, Shin and Smith (1999) to allow for heterogeneity between sectors. The major result of this study is that mark-ups are substantially higher in South African manufacturing industries than in comparable US industries, despite the greater likelihood of competitive pressure from foreign firms in South Africa. And these results are robust with respect to the various control variables and to the inclusion of intermediate inputs in the calculation of marginal cost. An important further result by Fedderke et al. (2007), to which we return below, is that lower mark-ups are associated with industries that are more open to international trade.

Aghion et al. (2006) builds on Fedderke et al. (2007) to confirm the robustness of the latter's results across more data sets and against a larger international sample and to investigate the link between competition in these manufacturing industries and their productivity growth. To that end Aghion et al. (2006) used three data sets¹² (two at the industry level and one at the firm level) to calculate price-cost margins¹³ and labour productivity over time and across industries. Their first important result, which confirms that of Fedderke et al. (2007), is that competition (as measured by the absence of pricing power) is both weak in South African manufacturing industries on an international comparison and that it has remained persistently weak over time (despite some evidence of increased competition for a period of the nineties, a trend which has since apparently reversed).

To complete the link between competition and productivity growth Aghion et al. (2006) offer evidence of a positive and economically meaningful relationship between increased competition and labour productivity growth in South African manufacturing industries. However, Aghion et al.'s (2006) result cannot be an important link in understanding the relative increase in TFP growth observed at the aggregate level and across sectors in South Africa since 1994 as their measures of pricing power remain persistently high over a period in which TFP growth increased markedly as a contributor to GDP growth in South Africa.

An important result by Fedderke et al. (2007) which does promise a partial explanation for the rise in TFP growth was mentioned above, namely that openness to international trade is associated with industries where mark-ups are lower. A second channel whereby openness might enhance TFP growth is the direct transfer of technology, either as information, or embodied in traded goods. It would be a partial explanation of the observed rise in TFP growth if the South African economy had become more open to trade since 1994 with the result of increasing competition and raising productivity.

The South African government had embarked publicly on a programme of trade liberalisation since the early nineties and has persisted with this programme since 1994. While average unweighted tariffs have certainly been sharply reduced there is some doubt as to whether effective liberalisation had occurred in many of the most important sectors in the economy. Fedderke and Vaze (2001) have, for example, argued that the effective protection for important sectors such as the financial sector and mining had risen during the nineties and that there had been little or no effective liberalisation from 1988 to 1998 in sectors representing just more than half of GDP. In contrast with Fedderke and Vaze (2001), Edwards and Lawrence (2006) reported evidence of effective liberalisation at the aggregate and sectoral level since the late 1980s. Arora and Bhundia (2003) had earlier offered evidence with a similar implication based on the sharp rise in South Africa's trade ratio¹⁴ as a measure of openness at the aggregate level, which they used in a time series model as one of two (weakly exogenous) factors to explain TFP growth in South Africa. And Jonsson and Subramanian (2001) had reported even stronger results, attributing 90% of TFP growth in South African between 1990 and 1997 to increased openness to trade.¹⁵

¹² These data sets are: (i) an industry-level panel data set for South Africa and 1000 other countries since the sixties from the UNIDO (United Nations Industrial Development Organization) International Industry Statistics 2004 database; (ii) an industry-level panel data set at the 3 digit level for 1970-2004 from South Africa's TIPS (Trade and Industrial Policy Strategies) data base and (iii) a firm-level panel since the early 1980s for listed companies in South Africa and 55 other countries from *Worldscope*.

¹³ Aghion et al. (2006) confirmed the robustness of their results with two different measures of the price-cost margin and one direct measure of the mark-up.

¹⁴ The trade ratio for South Africa was 49.2 percent in 1984 and had declined to 42 percent by 1994 before rising to 53.9 percent by 2004 (Table 2).

¹⁵ Jonsson and Subramanian (2001) identified four channels in the endogenous growth literature along which potentially positive effects for trade liberalisation on TFP growth might operate, namely: "(i) to employ a larger variety of intermediate goods and capital equipment which could enhance the productivity of its other resources; (ii) to acquire technology developed worldwide, especially in the form of embodied capital goods; (iii) to increase the variety of products produced and

To summarise, a large literature has identified a number of determinants of TFP growth in South Africa, but they do not easily explain the change in TFP growth that apparently occurred since 1994. The exception is openness to international trade. If the as yet controversial claims of a substantial liberalisation with respect to international trade are correct, then Fedderke et al.'s (2007) evidence of a link between international trade and local competition might combine with the evidence of a link between competition and production in Aghion et al. (2006) to offer an explanation for Arora and Bhundia's (2003) claim that trade openness has been an important factor in the rise of TFP growth in South Africa. However, Arora and Bhundia (2003) also suggested a second explanatory factor for the rise of TFP growth, namely investment in machinery and equipment, the consideration of which requires turning the attention to capital accumulation and its explanatory factors since 1994.

4.2 *Explaining capital accumulation*

Even though the long run convergence of the economy depends on TFP and the latter has lately accounted for a larger proportion of economic growth in South Africa, capital retains a prominent position in any comprehensive account of economic growth in South Africa (for example, Fedderke, 2005). In Robert Chirinko's (1993) review of the literature on the empirical modelling of business investment spending he identified three important areas for the research agenda on this topic: firstly, "financial structure and liquidity constraints", secondly, "additional dynamics" especially the connection between irreversibility and uncertainty, and finally, "an expanded view of the firm and investment decisions". The subsequent literature on the modelling of investment can be read through the lens of the research agenda mapped out by Chirinko (1993) and the South African contributions to that literature are summarised under three corresponding headings.

Financial structure and liquidity constraints

Financial structure, and especially the possibility of credit constraints, has been an important topic in models of investment expenditure in the South African literature of the last decade. This literature considers whether the financial structure and/or credit constraints have been an important constraint on investment expenditure in South Africa, despite the fairly high degree of financial sector development for an emerging market economy (Demirguc-Kunt and Levine, 2001; Aron and Muellbauer, 2005).

Du Toit and Moolman (2004) used a time series model (with a sample from 1970 to 2000) of a modified neoclassical investment function to incorporate a constraint on the internal and external sources for finance¹⁶. The equilibrium capital stock is determined by the user cost of capital in their model, but financial constraints affect the adjustment towards that equilibrium in the short run. Their model under-predicted actual investment post-1994, driven by the short-run impact of low saving, precarious external reserves and a high user cost of capital. However, the user cost of capital has since declined (Aron and Muellbauer, 2006) and external reserves have risen strongly, the combination of which is consistent with the rise in aggregate investment expenditure reported in table 2.

Fedderke (2004) proposed a model in the Dixit and Pindyck (1994) tradition to incorporate adjustment costs and both sectoral and systemic uncertainty as its main features. He also included a proxy for credit rationing – the ratio of gross operating surplus to total fixed capital stock – but found that this variable made no significant contribution to the model estimated on a panel of 3 digit manufacturing sectors for the period 1970 to 1997 with the pooled mean group estimator of Pesaran et al. (1999) to allow for short run heterogeneity together with homogeneity of the long run coefficients.

A second branch of this literature models investment expenditure as part of a system of equations with investment expenditure and real GDP growth amongst the jointly endogenous variables. Kularatne (2002) suggests two models in this tradition for South African growth and investment and finds a significant contribution for two financial sector variables (the ratio of private credit extension to GDP and a measure of stock market liquidity) to GDP growth, but only indirectly via the investment rate. He also finds that financial deepening through financial markets has been complementary to financial deepening via the banking sector in

consumed; and (iv) to improve the efficiency with which resources are used, which can help to change market structures and reduce markups, thereby imparting dynamic efficiency benefits" (Jonsson and Subramanian, 2001: 198-199).

¹⁶ Du Toit and Moolman (2004) proxied internal constraints with saving by households, corporates and government while external constraints included net foreign capital flows and the change in gold and other foreign exchange reserves. None of these proxies have an unambiguous interpretation as a financial constraint in domestic investment. Their model also included a time dummy for the period of international sanctions (1985-1992).

South Africa. Kularatne (2002) and Fedderke (2005) both suggest that the absence of a direct impact on the GDP growth is consistent with credit rationing. However, the same evidence is also consistent with many alternative hypotheses, including model misspecification (Kularatne, 2002).

In summary, there is no consensus yet on the influence of financial sector or liquidity constraints on investment expenditure in South Africa and the literature, except for Kularatne (2002), does not support any strong statements about the role of the financial sector in the pattern of investment expenditure since 1994. In contrast, a number of papers found a significant role for the user cost of capital in explaining investment expenditure at various levels of aggregation in South Africa. By implication the real interest rate, the rate of depreciation and the corporate tax rate become relevant explanatory factors for capital accumulation. Fedderke, Kayemba, Henderson, Mariotti and Vaze (2001b) suggested from their evidence that the user cost of capital had been an important constraint on investment in South Africa during the seventies, but had become less so over time. This is consistent with Aron and Muellbauer's (2006) calculation of the tax adjusted real market interest rate for South Africa post-2000 which compares favourably with a sample of industrialised and developing countries; evidence that supports Aron and Muellbauer's (2006) claim that inflation targeting has not entailed debilitating high real interest rates.

Uncertainty and irreversibility

Following Dixit and Pindyck's (1994) influential contribution, the explicit modelling of uncertainty has become a feature of empirical investment functions. Adding the restrictive assumption of irreversibility to the assumption of uncertainty leads this kind of model to predict that higher uncertainty will lower investment expenditure, even under risk neutrality. However, a less restrictive assumption of downward sloping demand curves yields the same prediction when combined with uncertainty (Nickell, 1978) and the empirical literature provides broad support for the hypothesis that uncertainty lowers investment internationally (Aron and Muellbauer, 2005).

Consistent with the international literature, Bleaney (1994), Fielding (1997) and Fedderke (2004) all report significant adverse effects for uncertainty on investment expenditure. Fedderke's (2004) results are particularly interesting for showing the separate contributions of both sectoral uncertainty (measured as the standard deviation of real value added per sector) and systemic uncertainty¹⁷. As a proxy for the systemic uncertainty Fedderke (2004) used a political instability index proposed by Fedderke, de Kadt and Luiz (2001a). While this measure contributed significantly to the variation of investment in Fedderke's (2004) sample, 1970-1997, it has since effectively declined to zero, based as it is on measures such as the "number of prosecutions under the Defence Acts and Emergency regulations", "the number of prosecutions for faction fighting", "the number of people proscribed and/or banned under the Suppression of Communism Act 1951" and so on (Fedderke et al., 2001a).

It is unlikely, therefore, that this measure of systemic risk contributes much to the explanation of investment in South Africa since 1994, though the absence of such uncertainty might contribute to an explanation of the investment recovery since 1994. Aron and Muellbauer (2005) also list systemic risk factors that have declined since 1994, including: closing the forward book, the adoption of inflation targeting, the recovery of economic growth and prudent fiscal policy¹⁸. However, there are also factors that might have increased systemic risk since 1994, such as: fears of the future protection of property rights and of future taxation, high crime rates, high HIV/AIDS incidence and inflexible labour markets (Aron and Muellbauer, 2005). The sectoral uncertainty, as measured by Fedderke (2004), has not declined uniformly either and remains a relevant factor influencing investment decisions in the manufacturing sectors.

An expanded view of the firm and its investment decision

A third plank in Chirinko's (1993) view of the desired research programme for research in investment expenditure was to see the investment decision in the context of the many other decisions taken continuously by firms (Chirinko, 1993: 1904). The South African literature has also advanced along these dimensions over the last ten years: firstly, by expanding the use of simultaneous equation models, secondly, by examining the interaction between the labour market and investment decisions, thirdly by considering the interaction between private and

¹⁷ Though Fedderke (2004) does not show whether the impact of uncertainty, as measured, would be robust to the inclusion of year dummies.

¹⁸ Mariotti (2002) presented further evidence that poor macroeconomic policy (a high proportion of government consumption relative to GDP) and macroeconomic volatility (a high inflation rate) are associated with lower growth in South Africa. Equating a high proportion of government consumption relative to GDP with poor macroeconomic policy is, however, controversial as it assumes that government consumption is *per se* destabilising.

public investment, notably infrastructure, and finally, by studying the influence of international capital flows.

Kularatne (2002) demonstrated joint endogeneity between growth, investment and liquidity, Mariotti (2002) also exploited the joint endogeneity between growth and investment to trace the impact of certain macroeconomic policy outcomes on growth, and most recently, Fedderke and Luiz (2005) have built a theoretical case, supported with econometric evidence, for the joint endogeneity of investment and political instability in South Africa.

Turning to the labour market, Fedderke (2004) focussed on the effect of human capital on the formation of physical capital. He used the ratio of skilled and highly-skilled to unskilled and semi-skilled workers per sector as a measure of the human capital content in the sector, and found this skills ratio to be positively and significantly related to investment. His result suggests a complementarity between human capital and investment in physical capital in the manufacturing sector; a result with policy implications given the dominant role of the public sector in education in South Africa.

The impact of public sector investment is not restricted to human capital though and there might be important crowding-in or crowding-out effects for public investment in physical capital. Both the composition and size of public sector investment are relevant to the likely impact thereof on private investment. If public investment is large relative to the tax base then the resulting debt burden and likelihood of either rising future taxes or future financial instability might depress investment expenditure. In contrast, public investment projects that lower transactions costs for private business or solve public goods-type problems might show a complementary effect on private investment.

Agénor's (2004) summary of the empirical literature for developing countries provides broad support for the complementarity thesis on public investment. In the South African literature both Fielding (1997) and Fedderke (2000) found evidence of crowding in by public investment. A more recent literature on South Africa considers one type of capital often financed by the public sector in South Africa: infrastructure. The first steps were taken by Perkins, Fedderke and Luiz (2005) who reported evidence of a feedback relationship between GDP growth and infrastructure investment from a newly constructed database measuring the stock of infrastructure over time.

In a more recent study Fedderke, Perkins and Luiz (2006) reported much stronger evidence that infrastructure investment might lead output growth in South Africa, with the feedback from growth to infrastructure discovered to be weaker in this second study. They found not only a direct impact for infrastructure on growth, but also an indirect channel via higher private sector investment in productive capital. These results are especially important given the dramatic slowdown in infrastructure investment in South Africa since the seventies which has seen the country fall behind other middle income countries along a number of infrastructure dimensions (Bogetić and Fedderke, 2005). The continued decline of public infrastructure over the decade since 1994, especially relative to an economy which had returned to growth by the late nineties, might on the evidence in Fedderke et al. (2006) have acted as a drag on growth. This is especially so given Fedderke and Bogetić's (2006) evidence of a positive relationship between infrastructure in South Africa and TFP in the country's manufacturing industries. After controlling for the likely simultaneity between infrastructure and growth they found economically and statistically significant spill-overs from infrastructure to TFP.

Up to this point we have only considered domestic aspects that might influence capital accumulation in South Africa, but there has long been an important international dimension to investment decisions in South Africa. We have already seen how such international influences offer one of the few channels for understanding the rise in TFP growth since 1994. And the empirical literature has also tried to capture the impact of international influences on domestic investment: in the form of an index of the country's international position (based on the exchange rate, trade performance, foreign direct investment, portfolio investment and relative export prices) by du Toit and Moolman (2004) and by including the gold price, terms of trade, real capital flows and the financial Rand discount as explanatory factors in Bleaney (1994).

An alternative approach is to model the determinants of capital flows to South Africa as has been done by Fedderke and Liu (2002) for 4 different measures of capital flows and Fedderke and Romm (2005) for foreign direct investment (FDI). The former study considers the potential impact of the exchange rate adjusted interest rate differential, the rate of domestic economic growth, a dummy variable for the financial liberalisation of the early nineties and various risk measures on total capital flows in a time series model for the sample 1960 to 1995. In addition to the expected portfolio theoretic results they found that net capital flows to South Africa had been adversely affected by political risk and (temporarily) by financial liberalisation.

Fedderke and Romm (2005) derived two important results: first, FDI contributes positively to economic growth in SA by complementing domestic capital, interpreted as evidence of technological spill-over from foreign capital. While FDI crowds out domestic investment in the short run, this is not true in the long run. Second, they identified factors associated with FDI flows to South Africa empirically, including: corporate tax rates, wage costs, the openness of the economy and the protection of property rights. While corporate tax rates, the openness of the economy and the protection of property rights have made South Africa more attractive for FDI flows over the last decade, wage costs may well have been a drag on FDI (Fedderke, 2005).

The change in the contribution of foreign saving to the financing of domestic investment from a negative in the period prior to 1994 to a positive in the past ten years is an important part of the benefit of South Africa's political transition (table 3 above). During the period 1985 to 1993 South Africa experienced a near-absolute balance of payments constraint following the debt crises in 1985 and the financial sanctions imposed on the Apartheid government. The political transition in 1994 re-opened the international financial markets to South Africa allowing for a normalization of the capital account of the balance of payments.

Under these circumstances, it was generally expected that foreign capital inflows, especially foreign direct investment (FDI), would contribute considerably to the financing of investment. However, FDI flows have somewhat disappointed in the ten years since 1994 (see table 4 above). Portfolio investment, on the other hand, accounted for 42 percent of total capital flows to South Africa since 1994. The conventional view in the literature is that portfolio flows are more unstable than (longer term) FDI (Agénor, 2004), but this convention has not gone unchallenged (Claessens, Dooley and Warner, 1995).

In summary, the empirical literature on investment expenditure in South Africa suggests that the recovery in investment since 1994 could be attributed to a combination of the following factors: lower systemic risk, lower user cost of capital and by an increased inflow of foreign capital, which has been associated with lower risk and macroeconomic policy prudence. Lower corporate taxes and institutional protection for property rights have also been associated with improved FDI.

4.3 Explaining employment growth

Explaining employment behaviour in the South African economy in the period since 1994 is no simple matter; not only is there little consensus in the literature on the various potential causes of South African employment growth, but the basic statistics on employment and unemployment are also controversial. In discussing the possible determinants of employment the following are considered briefly: output growth, wages and trade liberalization and a number of others are noted. This discussion is preceded by a brief consideration of the problematic nature of South Africa's labour market statistics.

The statistics on South African employment and other labour market characteristics has been subjected to considerable scrutiny in the literature and generally found wanting (Standing, Sender and Weeks, 1996; Klasen and Woolard, 1999)¹⁹. Earlier analyses of employment, which were based on formal sector statistics only, suggested that South Africa was experiencing "jobless" growth in the 1990's (i.e. declines in employment associated with positive economic growth) but more recent analyses (which also provide for informal employment) provided a more positive picture of the employment generating capacity of the economy (Bhorat and Oosthuizen, 2005; Burger and Woolard, 2005). These problems with compiling and interpreting South Africa's labour market statistics complicate considerably empirical analyses of the causes of employment growth.

The standard potential determinants of employment in a market economy include output growth and (real) wages. As far as output growth is concerned, South Africa's performance since 1994 was insufficient to support the rate of employment growth required to address the growing unemployment problem²⁰. Furthermore, Fedderke et al. (2001b: 498) added that "...economic growth in South Africa has been poor at generating additional employment ever since the 1970's". Indeed, some of the earlier research (for example, Loots, 1998) suggested that the employment elasticity of output growth (at least with respect to formal sector employment) was in a secular decline. But this, too, has been disputed and some of the more recent research, for example Bhorat and Oosthuizen (2005), argue that employment growth at least kept pace with the growth of the working age population.

¹⁹ See also footnote 5 above.

²⁰ It should be noted, however, that increases in labour force participation have substantially exceeded the rate of growth of the working age population in South Africa since the late 1990s (Bhorat and Oosthuizen, 2005).

The impact of real wages on employment has been considered in a number of studies, generally indicating that labour demand in South Africa is relatively wage elastic. Fallon and Lucas (1998), for example, estimated a wage elasticity of employment of -0.71 and Natrass (2000: 84) refers to estimates ranging from -0.66 to -0.85. Fedderke, Shin and Vaze (2003b) found even higher wage elasticities of -1.97 in manufacturing and elasticities for unskilled labour in the formal labour market ranging from -2.00 to -2.23. Consequently, if real wages had increased substantially since 1994, this could (at least partly) explain the relatively slow employment growth, or in the Fedderke's (2005: 22) words: "...labour mispricing continues to be an important factor in South Africa's poor track record of job creation ...". Unfortunately the evidence on real wages remains ambiguous. Kingdon and Knight (2005), for example, reports both increases and decreases in real wages in the period 1995 to 2003 from different data sources. Banerjee et al. (2006) and Burger and Yu (2006)²¹ in turn, suggest that real wages were largely stagnant during this period.

Trade liberalization, which is generally associated with improved economic growth and employment performance (for example, Dollar and Kraay, 2001) has been identified as a negative factor in South Africa's employment experience in the 1990's, particularly with respect to unskilled labour. A strong proponent of this view is Natrass (2000) who identifies competition from low wage, labour intensive exporting countries and the shift to capital- and skill-intensive productive sectors under the impact of globalization as important factors holding back employment growth. Barker (2003: 186) adds two additional reasons: (i) a relative increase in demand for skilled workers (and a decrease in the demand for unskilled labour) as a result of the drive to increased productivity by South African firms to improve their international competitive position, and (ii) the increase in the capital- and skill intensity of production of natural resource-based products which feature strongly in South Africa's export mix.

However, the proposition that trade liberalization has impacted (significantly) negatively on unskilled employment in South Africa has also been challenged. Edwards (2001) offered two counter arguments, first that other factors than trade liberalization (such as, e.g. changes in domestic demand, labour regulations and relative wages) may have been responsible for sectoral shifts away from unskilled labour and second, the creation of employment in export-producing firms. Finally, Fedderke, Shin and Vaze (2003b) shows that trade liberalization has resulted in a positive impact on labour demand but that the associated technological changes have been labour-saving.

Other factors which could have acted as a brake on employment growth (but which remain controversial in the literature) might be grouped under three headings: The first group include labour market institutions, for example, labour market inflexibility as a result of the relatively strong position of labour unions in South Africa and new labour legislation enacted after 1994 (Barker, 2003; Burger and Woolard, 2005) and the mismatch between the required skills levels and the labour force and employment (Burger and Woolard, 2005; Pauw, Oosthuizen and Van Der Westhuizen, 2006). A second group of factors are sectoral, including concerns over a perceived increase in the capital intensity of production (Bhorat and Oosthuizen, 2005; Pauw et al., 2006), increased concentration in the manufacturing sector (Fedderke and Szalontai, 2003) and sectoral changes in demand (i.e. from mining and agriculture to services) (Bhorat and Oosthuizen, 2005; Banerjee et al., 2006). Finally, the labour market impact of the high prevalence of HIV/AIDS in South Africa (Arndt and Lewis, 2000; Laubscher, Smit and Visagie, 2001).

In summary, the empirical literature on South Africa's employment growth performance has considered a number of possible determinants, including output growth, real wages, trade liberalization, labour market flexibility, sectoral demand shifts, skills and capital intensity issues and HIV/AIDS. Furthermore, the lacklustre employment growth contributed relatively modestly to overall economic growth. Though a considerable literature tries to explain this labour market outcome, many questions remain unresolved. It is clear, however, that the same issues identified above with respect to capital and productivity, namely, the increasing openness of the economy and factor pricing, in this case real wages, have played a crucial role in the evolution of the South African labour market since 1994.

5. CONCLUSION

Having unpacked and examined the various contributing factors to economic growth in South African since 1994

²¹ However, it should be noted that real wages (of especially unskilled labour) increased substantially in the 10 year prior to 1994, raising the level of real wages.

we are now in a position to reassemble the message from the constituent parts. Compared with a peer group of countries the initial conditions for a dramatic growth recovery in South Africa were inauspicious in 1994. The economy had been in relative decline for decades while the legacy of apartheid was particularly evident in a very high level of income inequality (with the associated risks of punitive taxes or social unrest) and in the highly unequal level and especially poor quality of education across the different population groups. Meanwhile demographic factors (e.g. a relatively high fertility rate) placed pressure on the labour market.

Fifty percent or more (depending on the assumptions used in the growth accounting) of South Africa's subsequent economic recovery can be attributed to total factor productivity growth. With very few exceptions this aggregate level result also holds at the level of sectors and (the manufacturing) sub-sectors in the South African economy. While it is difficult to account for this recovery in productivity growth, the most compelling evidence reported here finds the economy's increasing openness to international trade to be the leading cause of rising productivity locally. Authors such as Jonsson and Subramanian (2001) explained this by appeal to the endogenous growth literature, but Fedderke et al. (2007) added evidence that this effect might be working through increased competition at the sectoral level. It remains for future research to examine along which of the candidate routes (see footnote 15) trade openness had encouraged productivity growth in South Africa since 1995.

Trade openness, as well as openness to international capital flows, were also important factors explaining the revival of investment expenditure as a contributing factor to growth in the post 1994 period. Other factors that have been associated with higher investment rates in South Africa, such as a lower user cost of capital and lower systemic and sectoral uncertainty are also consistent with the modest recovery in investment seen over the last decade. Factor prices and the increasing openness of the economy also feature strongly in the labour market literature and attempts to explain the lacklustre performance of employment growth since 1994. In contrast with investment where the factor price has been declining, the issue in the labour market literature is the suspected high level of real wages and the nuanced effect of trade liberalisation on labour demand.

In summary, the evidence offered here suggests that it was openness (to trade and capital flows), lower uncertainty and lower interest rates that explain South Africa's growth recovery since 1994. It is a result with policy implications: the lower systematic risk associated with the post-1994 political dispensation have economic as well as social value, and the orthodox macroeconomic policies of this period have also lowered overall risk and the user cost of capital. Finally, increasing openness to trade and capital flows has been key to the economic recovery, a result which suggests gains from further steps in this direction.

APPENDIX A

Table A.1 lists the countries used in the international comparison of section 3.1. This set was constructed by combining the groups suggested respectively by Feinstein (2005) and Moll (1991) for such a comparison and the second column of Table A.1 shows whether Moll, Feinstein or both included the relevant country in their comparative sets. There was very considerable overlap between these two authors, and extending the Feinstein (2005) selection by 3 countries (Sri Lanka, Turkey and Venezuela) gave the union of the two sets.

Table A.2 shows the values taken by the proxies of initial conditions used in section 3.1. for: development of human capital, the fertility rate, access to public services, income inequality, the export share in GDP and the share of manufactured goods within exports. The peer group is the same group of 33 countries used for the long term per capita GDP comparison less those countries which were unambiguously developed countries by 1994. This left a group of 21 developing countries in the control group as listed in table A.2.

Table A.1 about here

Table A.2 about here

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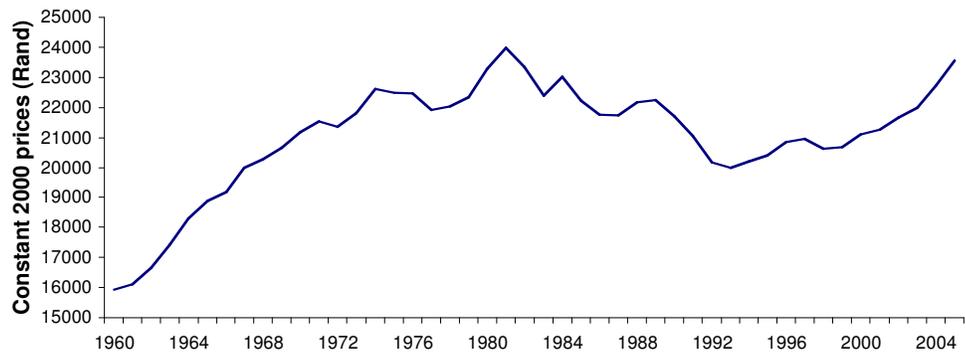
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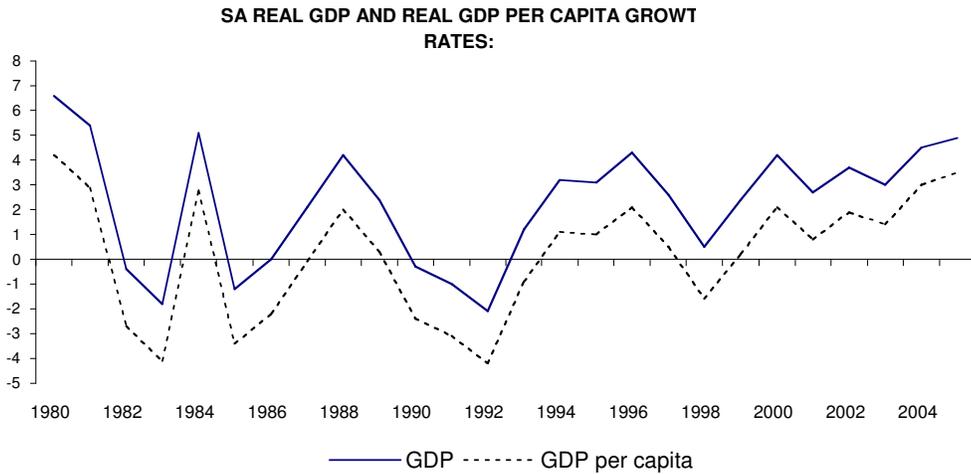
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Figure 1 Real GDP per capita since 1960 (in 2000 prices)



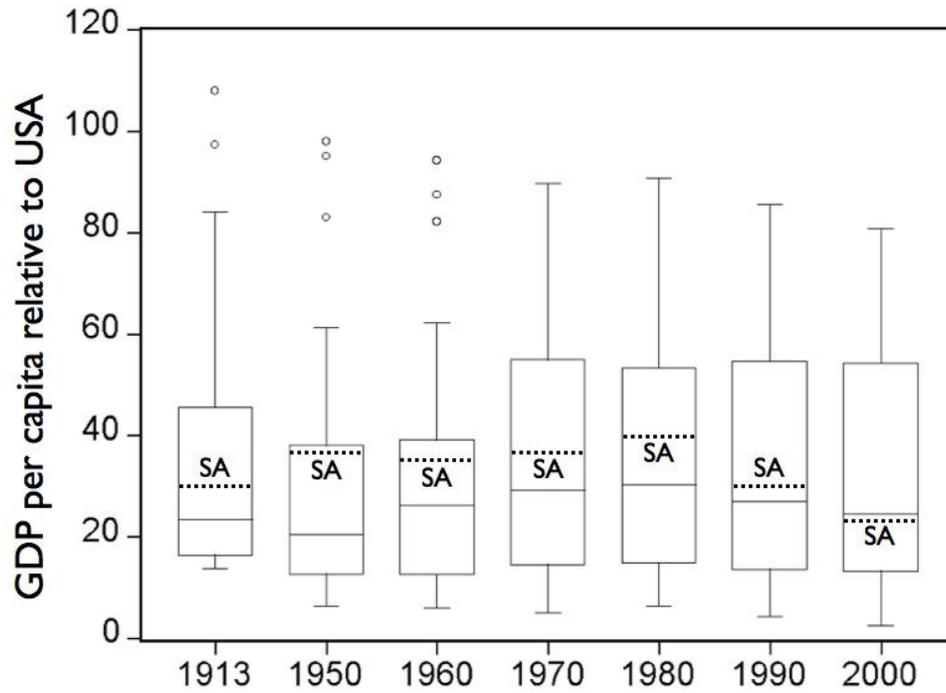
Data source: SA Reserve Bank Quarterly Bulletin

Figure 2 SA real GDP and real GDP per capita growth rates: 1980-2004



Data source: SA Reserve Bank Quarterly Bulletin

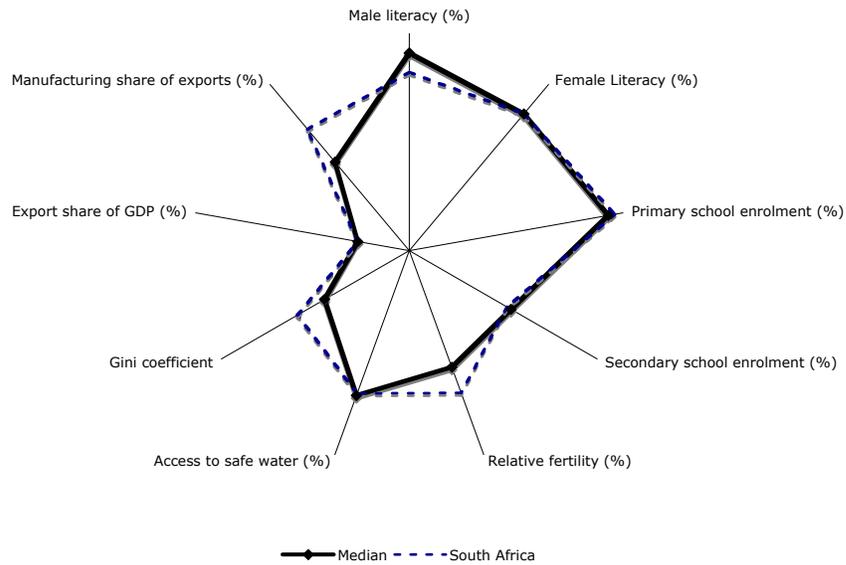
Figure 3 Relative performance of the South African economy (GDP per capita)



Source: calculated using data from Penn World Table version 6.1 (Heston, Summers and Aten, 2002) and Maddison (2002). The data set was constructed by combining the groups suggested respectively by Feinstein (2005) and Moll (1991). There was very considerable overlap between these two authors, and extending the Feinstein (2005) selection by 3 countries (Sri Lanka, Turkey and Venezuela) gave the union of the two sets as shown in Appendix A.

The box plot is of standard construction (see for example, Hamilton, 1996) and shows the middle 50 percent of the data inside each box, the median as the solid line within each box and the outliers as dots beyond the whiskers (which mark a distance of 1.5 times the inter-quartile range above the 3rd quartile and below the first quartile). Each box shows the distribution of GDP per capita relative to the USA for the sample countries for the particular year shown on the x-axis. The dotted line shows the position of SA within the distribution for each of the years.

Figure 4 Initial conditions measured by social and economic indicators



Data source: calculated using data from World Development reports (1995; 1996; 1998; 2001) as shown in Appendix A.

The peer group is the same group of 33 countries used in figure 3 less those countries which were unambiguously developed countries by 1994. This left a group of 21 developing countries in the control group. All of the conditions were assessed in 1995, with the exception of fertility (1994) the export share of GDP (1994), the manufacturing share of exports (1995) and the Gini coefficients which are mostly based on censuses from 1994 to 1996 as shown in the Appendix. The data for each item is scaled from 1 to 100 along the relevant radius.

Table 1 Sectoral distribution of production (GDP% at nominal basic prices and % change in basic 2000 prices)

	% of GDP			Average annual % change	
	1984	1994	2004	1985-1994	1995-2004
Primary sector	17.5	11.9	10.1	0.5	0.3
- Agriculture, forestry and fishing	4.8	4.6	3.1	3.9	0.4
- Mining and quarrying	12.7	7.3	7.0	-0.6	0.3
Secondary sector	30.5	27.7	23.8	-0.03	2.7
- Manufacturing	23.0	20.9	19.1	-0.1	2.8
- Electricity, gas and water	3.7	3.6	2.4	4.0	1.6
- Construction (contractors)	3.7	3.1	2.3	-2.6	3.5
Tertiary sector	52.0	60.4	66.1	1.4	3.8
- Wholesale and retail trade, catering and accommodation	11.6	14.2	14.1	-0.1	4.3
- Transport, storage and communication	9.0	8.7	9.8	1.6	6.9
- Financial intermediation, insurance, real estate and business services	13.1	16.0	21.0	1.8	5.2
- Community, social and personal services	18.3	21.5	21.2	2.0	1.1
GDP at basic prices	100	100	100	0.9	3.1

Data source: SA Reserve Bank Quarterly Bulletin

Table 2 *Gross fixed capital formation (% of GDP at current prices and % change in constant 2000 prices)*

	% of Total Fixed Investment			Average annual % change	
	1984	1994	2004	1985-1994	1995-2004
<u>Investment by type of organization:</u>					
- General government	23.2	15.5	16.8	-5.5	4.6
- Public corporations	18.2	11.5	10.9	-6.0	5.0
- Private	58.6	72.9	72.3	-0.1	5.1
<u>Investment by type of asset:</u>					
- Residential buildings	15.0	10.3	10.2	-5.1	3.2
- Non-residential buildings	13.0	12.2	10.1	-2.0	1.4
- Construction works	17.3	14.3	15.6	-3.5	4.0
- Transport equipment	10.8	15.0	13.2	-2.7	4.6
- Machinery and other equipment	41.2	44.2	47.0	-0.5	7.0
<u>Investment by kind of economic activity:</u>					
- Agriculture, forestry and fishing	3.6	4.0	3.3	-1.4	0.4
- Mining and quarrying	10.2	9.0	7.9	-2.0	3.5
- Manufacturing	18.8	23.3	20.1	0.1	4.5
- Electricity, gas and water	16.4	7.5	4.6	-9.5	0.1
- Construction (contractors)	1.5	1.1	1.8	-5.6	11.3
- Wholesale and retail, trade, catering and accommodation	6.2	6.4	7.5	-1.9	6.2
- Transport, storage and communication	10.1	11.1	13.5	-2.3	8.0
- Financial intermediation, insurance, real estate and business services	21.3	23.4	24.5	-1.7	5.1
- Community, social and personal services	11.9	14.1	17.1	0.2	6.2
<u>Gross fixed capital formation*</u>	24.0	15.2	16.2	-2.3	5.1

*% of GDP

Date Source: SA Reserve Bank Quarterly Bulletin

Table 3 *Financing of gross capital formation (as % of GDP, period averages)*

	1985 – 1994	1995 – 2004
Saving by households	3.0	0.8
Corporate saving	5.5	4.9
Saving by general government	-3.9	-3.1
Consumption of fixed capital	15.7	12.8
Gross domestic saving	20.2	15.5
Foreign investment	-2.5	2.4
Gross capital formation	17.7	17.9

Data source: South African Reserve Bank Quarterly Bulletin

Table 4 Foreign capital inflows (average % of GDP)

	1985-1994	1995-2004
Direct investment	-0.41	0.86
Portfolio investment	0.18	1.17
Other investment	-1.17	0.58
Total capital flows (incl. Unrecorded transactions)	-2.08	2.78

Data source: South African Reserve Bank Quarterly Bulletin

Table 5 Factors of production and income shares: average annual % changes and average shares

	1985 – 1994	1995 – 2004
Fixed capital stock (2000 prices)	1.01	1.37
Employment (total) ^a	1.14	1.13
- Highly skilled ^b	4.03 (50.7)	2.07 (49.8)
- Skilled ^b	1.85 (34.6)	1.82 (34.7)
- Semi- and unskilled ^b	0.23 (14.7)	0.37(15.4)
Average years of schooling ^b	1.8	0.9
Wage income share ^c	0.57	0.54
Capital income share ^c	0.43	0.46

The figures in brackets represent average wage bill shares.

^a Formal and informal sector employment as estimated by Quantec Research on the basis of the Survey of Employment and Earnings (P0271), the Survey of Employment Earnings (P0275), and the Labour Force Survey (P0210).

^b Average annual percentage change, based on the 2000 Census.

^c Average for 1985 – 1994 and 1995 - 2004, based on national accounts statistics as published by the SARB.

Table 6 Sources of output growth in South Africa: 1985 – 2004

Human Capital Treatment	Period	Output growth	Capital contribution	Labour contribution	Total factor productivity
No provision for human capital	1985-1994	0.8	0.45	0.63	-0.28
	1995-2004	3.1	0.62	0.62	1.86
Human capital based on average years of schooling	1985-1994	0.8	0.45	1.11	-0.76
	1995-2004	3.1	0.62	0.88	1.60
Human capital represented by 3 skills levels	1985-1994	0.8	0.45	1.49	-1.14
	1995-2004	3.1	0.62	0.95	1.53

Table 7 Recent studies on the sources of output growth in South Africa

Study	Period	Output growth	Capital contribution	Labour contribution	Total factor productivity
Arora (2005)	1980-1994	1.2	0.8	0.7	-0.4
	1995-2003	2.9	0.7	0.9	1.3
Fedderke (2002)	1970s	3.21	2.54	1.17	-0.49
	1980s	2.20	1.24	0.62	0.34
	1990s	0.94	0.44	-0.58	1.07

Table 8 Sources of output growth in South Africa: Sectoral: 1985-2004

	Output Growth		Capital contribution		Labour contribution		Total factor productivity	
	1985-1994	1995-2004	1985-1994	1995-2004	1985-1994	1995-2004	1985-1994	1995-2004
Primary sector	0.47	0.31	0.51	0.32	-0.43	-0.75	0.39	0.74
- Agriculture, forestry and fishing	3.89	0.44	-1.38	-0.18	-0.04	-0.35	2.55	0.61
- Mining and quarrying	-0.58	0.26	1.45	0.50	-1.07	-1.37	-0.96	1.13
Secondary sector	-0.03	2.73	0.21	0.31	-0.50	-1.22	0.26	3.64
- Manufacturing	-0.1	2.78	0.49	0.7	-0.47	-0.67	-0.12	2.75
- Electricity, gas and water	3.95	1.61	-0.29	-0.86	-1.55	-0.92	5.79	3.39
- Construction (contractors)	-2.64	3.48	-0.83	1.65	-0.36	-3.44	-1.45	-1.61
Tertiary sector	1.41	3.79	0.54	0.72	0.24	0.97	0.64	2.10
- Wholesale and retail trade, catering and accommodation	-0.11	4.3	0.48	1.07	0.27	1.18	-0.86	2.05
- Transport, storage and communication	1.58	6.85	0.09	0.97	2.8	-1.6	4.29	7.48
- Financial intermediation, insurance, real estate and business services	1.77	5.16	0.76	0.76	4.11	3.26	-3.10	1.14

Data source: Quantec

Table 9 Sources of output growth in South Africa: Manufacturing sub-sectors: 1985-2004

	Output growth		Capital contribution		Labour contribution		Total factor productivity	
	1985-1994	1995-2004	1985-1994	1995-2004	1985-1994	1995-2004	1985-1994	1995-2004
Food, beverages and tobacco	-0.01	0.86	1.05	0.12	-0.24	-1.28	-0.82	2.02
Textiles, clothing and leather	-1.89	0.54	-0.60	-0.15	-1.20	-1.59	-0.09	2.28
Wood and paper; publishing and printing	0.54	1.34	-0.91	1.20	0.20	-0.05	1.25	0.19
Petroleum	1.06	5.36	1.02	0.80	0.24	0.12	-0.20	4.44
Other non-metallic mineral products	-0.49	0.41	-1.17	-0.03	-0.06	-1.80	0.74	2.24
Metals, metal products, machinery and equipment	-2.29	3.44	0.58	0.56	-1.49	-0.46	-1.38	3.34
Electrical machinery and apparatus	-0.33	2.95	-0.82	-0.51	-0.87	-3.72	1.36	7.18
Radio, TV, instruments, watches and clocks	1.83	-1.22	-0.71	0.80	1.73	-0.58	0.81	-1.44
Transport equipment	-2.80	4.72	1.58	2.32	-1.36	0.12	-2.02	2.28
Furniture and other equipment	7.97	1.98	2.05	3.90	1.03	0.28	4.89	-2.20

Data source: Quantec

Table A.1 Data used in the cross country comparison

Country	Source	GDP per capita relative to the USA						
		1913	1950	1960	1970	1980	1990	2000
Argentina	Moll (1991), Feinstein (2005)	72	61	60	55	50	27	33
Australia	Feinstein (2005)	108	95	87	90	81	76	76
Austria	Moll (1991), Feinstein (2005)	65	38	60	69	75	75	70
Brazil	Moll (1991), Feinstein (2005)	15	15	19	22	30	24	22
Canada	Feinstein (2005)	84	83	82	82	91	85	81
Chile	Moll (1991), Feinstein (2005)	50	40	31	31	26	23	29
Columbia	Moll (1991), Feinstein (2005)	23	21	20	18	20	19	16
Algeria	Moll (1991), Feinstein (2005)	.	.	20	18	30	19	17
Egypt	Feinstein (2005)	14	16	13	13	14	12	12
Spain	Moll (1991), Feinstein (2005)	43	28	38	55	53	54	53
Finland	Feinstein (2005)	40	48	62	69	72	77	69
Ghana	Moll (1991), Feinstein (2005)	14	12	14	10	7	5	4
Greece	Moll (1991), Feinstein (2005)	30	20	33	49	54	44	44
Indonesia	Feinstein (2005)	17	9	6	5	9	11	11
Ireland	Feinstein (2005)	.	37	41	44	46	55	76
Italy	Moll (1991), Feinstein (2005)	48	38	56	68	69	73	64
Japan	Moll (1991), Feinstein (2005)	26	21	38	72	73	84	73
Korea (South)	Feinstein (2005)	17	8	12	16	22	38	42
Sri Lanka	Moll (1991), Moll (1991)	16	14	12	9	8	9	11
South Africa	Moll (1991), Feinstein (2005)	30	38	37	38	40	30	23
Morocco	Feinstein (2005)	15	12	10	13	14	13	12
Mexico	Moll (1991), Feinstein (2005)	33	30	33	33	38	28	27
Malaysia	Moll (1991), Feinstein (2005)	17	16	19	17	24	24	26
Nigeria	Moll (1991), Feinstein (2005)	.	6	8	5	7	4	2
New Zealand	Feinstein (2005)	97	98	94	80	65	61	56
Pakistan	Feinstein (2005)	.	9	7	8	6	7	6
Peru	Moll (1991), Feinstein (2005)	20	25	26	29	24	14	13
Philippines	Feinstein (2005)	20	14	17	15	15	11	11
Portugal	Moll (1991), Feinstein (2005)	24	20	27	37	39	45	48
Thailand	Feinstein (2005)	16	10	10	12	13	18	19
Turkey	Moll (1991)	.	18	22	22	20	22	21
Taiwan	Feinstein (2005)	14	10	11	17	27	42	.
Venezuela	Moll (1991)	21	33	36	32	39	28	20

Sources: Moll (1991), Feinstein (2005), Penn World Table version 6.1 (Heston et al., 2002) and Maddison (2002).

Table A.2 Proxies of the initial conditions

	Male literacy (%)	Female literacy (%)	Primary enrolment	Secondary enrolment	Total fertility	Access to safe water	Gini coefficient	Census year ^a	Export share of GDP	Manufacturing share of exports
	1995	1995	1995	1995	1994	1995			1994	1993
Algeria	74	49	100	59	3.7		35.3	1995	24	3
Argentina	96	96	90	19	2.6	64	52.2	2001	7	32
Brazil	83	83	86	55	2.8	72	60	1996	8	60
Chile	95	95	85	50	2.5	85	56.6	1994	28	19
Colombia	91	91	89	65	2.6	76	57.1	1996	15	40
Egypt	64	39			3.5	64	28.9	1995	22	33
Ghana	76	53	97	42	5.3	56	33.9	1992	25	23
Indonesia	90	78	99	96	2.7	62	36.5	1996	25	53
Korea (South)	99	97	91	64	1.8	89	31.6	1993	36	93
Malaysia	89	78	100	66	3.4	88	48.5	1995	90	65
Mexico	92	87	72	38	3.2	83	53.7	1995	11	53
Morocco	57	31			3.5	52	39.5	1998-99	22	57
Nigeria	67	47			5.6	39	45	1992-93	22	2
Pakistan	50	33	91	53	5.4	60	31.2	1996-97	16	85
Peru	94	83	100	60	3.1	60	46.2	1996	11	17
Philippines	95	94	96	52	3.8	83	42.9	1994	34	76
South Africa	82	82			3.9	70	59.3	1993-94	24	73
Sri Lanka	93	87			2.4	46	34.4	1995	34	72
Thailand	96	92	96	50	2	81	46.2	1992	39	72
Turkey	92	72	82	14	3.2	92	41.5	1994	21	71
Venezuela	92	80	100	59	3.2	79	46.8	1995	30	14
Median	91	82	93	54	3.2	71	45		24	53
Mean	84	74	92	52	3.3	70	44		26	48
Standard deviation	14	22	8	19	1.04	15	10		17	28

Sources: World Development reports (World Bank, 1995, 1996, 1998, 2001)

^a: The “census year” indicates the date of the survey on which the Gini coefficient is based.