2

Economic Growth in Post-Apartheid South Africa: A Growth-Accounting Analysis

Vivek Arora

This chapter examines South Africa's growth performance since 1994 within a growth-accounting framework, and assesses growth prospects going forward.[1] Near-term prospects can be captured by potential output growth and the output gap (the difference between actual and potential output). Together with other indicators, this can provide an indication of the intensity of resource utilization and inflationary pressures.[2] Longer-term growth prospects can be assessed on the basis of the full utilization of factors of production and the output gains that arise as these factors are

---

[1]This chapter draws in part on Arora and Bhundia (2003). The revisions to the historical GDP data announced by Statistics South Africa in November 2005 came after the analysis in this chapter had already been done. Although the revised average GDP growth rate for the past decade is marginally higher than reported in the chapter, the analysis is not substantively affected by the revisions.

[2]See U.S. Congressional Budget Office (2001) for a discussion of the concept of potential output, which is a measure of the level of GDP that an economy can attain when it operates at high rates of resource utilization. Potential output does not represent a ceiling above which output cannot rise, but rather captures the maximum sustainable level of GDP that is consistent with a stable rate of inflation. If actual output rises above its potential level, then inflationary pressures start to build as capacity constraints start to bind. It should be noted that the level and growth rate of an economy's potential output can be expected to change over time as their determinants change.

more effectively utilized, for example, through structural reforms that enhance efficiency.

South Africa's growth performance has strengthened substantially since the end of apartheid in 1994. Estimates of potential output growth based on alternative methodologies, including a standard production function approach, suggest that during 1995–2003 the rate of potential output growth increased to 3 percent. The measure of potential output is based on historical rates of factor utilization and total factor productivity (TFP), rather than on literal full employment.[3] In addition, it should be noted that being based on historical data, it includes the effects of structural and institutional rigidities that may have impeded growth in the past but not necessarily in the future. The actual rate of real GDP growth also rose to nearly 3 percent, from 1¼ percent during 1980–94, largely reflecting a turnaround in TFP growth as the combined growth contribution of labor and capital accumulation stayed roughly unchanged.[4] The strong TFP performance owes in part to policy and institutional changes during the period, particularly increasing international trade and greater private sector participation in the economy. It is significant because growth can generally be better sustained over longer periods of time when it is based on improvements in technology and efficiency—which are embodied in TFP—rather than on factor accumulation, which is subject to inherent limits based on demographics and diminishing returns.

South Africa's long-run growth prospects depend importantly on policies and institutions that will help to maintain TFP growth, reduce unemployment (by enhancing job skills, increasing labor-market flexibility, and lowering the costs of labor relative to capital), and improve the investment environment. In this view, it is actions that reduce unemployment that lead to higher growth, rather than the reverse. If the recent TFP growth rates of around 1¼ percent are maintained and the unemployment rate is steadily reduced through the end of the decade, annual real GDP growth could rise to well over 5 percent. There are, however, several risks to the long-run outlook, including the potential adverse impact of HIV/AIDS on the labor force and productivity.

---

[3]The latter kind of calculation is useful for assessing how much output the economy could produce if hitherto unemployed resources were all to be employed. It is more useful for assessing long-run growth prospects and is discussed in the next section. Earlier analyses along these lines include Arora, Bhundia, and Bagattini (2003); De Wet (1995); and Strydom (1995).

[4]In the growth accounting approach, a production function is used to analyze real GDP growth in terms of the contributions to growth of labor and capital. The residual, which cannot be explained by labor and capital, is assumed to represent TFP.

Table 2.1. Contributions to Growth
(Average in percentage points)

	1980–94	1995–2003	1980–2003
Annual real GDP growth (percent)	1.2	2.9	1.8
Labor	0.7	0.9	0.8
Capital	0.8	0.7	0.7
Total factor productivity	−0.4	1.3	0.3

Source: Author's calculations based on data from Statistics South Africa.

Growth Performance in Post-Apartheid South Africa

Trends in Economic Growth

The results of a growth accounting exercise suggest that the increase in real GDP growth after 1994 reflects a substantial increase in TFP growth rather than greater factor accumulation (Table 2.1).[5] The average annual rate of employment growth rose from an estimated 1½ percent during 1980–93 to 1¾ percent during 1995–2003. While formal employment actually declined during 1995–2003, this was more than offset by an increase in informal employment.[6] The decline in the contribution to growth of capital during 1995–2003 reflects a continuation of the slowing in investment that started in the 1980s. Average annual growth in the capital stock declined to 1¼ percent during 1995–2003, from 1¾ percent during 1980–94. As a result, the contribution to GDP growth of capital and labor remained unchanged at 1½ percentage points annually during 1980–2003, although the relative contribution of labor increased after 1994. The

---

[5]This reinforces the conclusion of a previous study on growth accounting, which found that TFP growth turned around during the early 1990s and bolstered a flagging growth performance (see International Monetary Fund, 1998). The exercise presented here assumes a Cobb-Douglas production function with constant shares over time for labor and capital. The shares are assumed to be equal to the respective shares in national income—55 percent and 45 percent, respectively—although the results throughout the chapter do not vary significantly with alternative assumptions regarding labor and capital shares.

[6]The calculations are based on total employment, which comprises formal and informal sector employment, as reported by Statistics South Africa in its Labour Force Surveys. However, because the official series for total employment has a break in 1995, since it assumes that during the previous period total employment was the same as formal employment (that is, informal employment was zero), the calculations in this chapter assume that there was some informal employment in the preceding period, thereby mitigating the break in the series in 1995 (details are available on request). The implication is that the growth accounting results differ from those in previous analyses that have tended to rely on the formal employment series and show smaller growth contributions from employment with correspondingly higher contributions from TFP (see, for example, Arora, Bhundia, and Bagattini, 2003).

unchanged contribution from factor accumulation was accompanied by a substantial increase in TFP growth.

The general conclusion is robust to alternative assumptions regarding the shares of capital and labor in output. The use of national-income-based shares is sometimes criticized because it assumes that capital and labor markets are perfectly competitive. In South Africa, with large labor market imperfections, the assumption may be unrealistic. However, under an alternative estimate of the labor share based on Sarel (1997), which uses a disaggregated approach and adjusts for market imperfections, it still holds that the turnaround in GDP growth in the recent period reflected TFP growth, the impact of which shifted from a negative annual contribution of minus ½ percentage points in 1980–94 to a positive contribution of 1¼ percentage points annually during 1995–2003.

The turnaround in TFP performance in the recent period reflects in part policy and institutional changes. South Africa's greater openness to trade and investment may have become important vehicles for technological spillover effects and allowed greater access to imports of equipment and intermediate inputs, in which technological improvements are often embodied. Greater private sector participation in the economy, such as through deregulation and privatization, may also have raised technological innovation.

In South Africa, the scope for positive influences on TFP has increased with greater openness of the economy, a rising share of capital goods in imports, and a greater role of the private sector in total investment, including in machinery and equipment investment (Table 2.2).

The shares of trade in GDP and of private investment in total investment have increased markedly since the opening up of the economy in 1994, and so has the share of equipment and machinery investment in the total. Jonsson and Subramanian (2001) show that trade liberalization and openness following the removal of sanctions in the early 1990s had a statistically significant positive impact on TFP growth. Arora and Bhundia (2003) demonstrate that there is a stable long-run relationship among TFP, openness, and private investment, and that both of the latter variables are positively correlated with TFP.[7] Overall, these results support the conclusion that greater trade openness, private participation in the economy, and other policy and institutional changes since 1994 have played a significant role in raising TFP growth in South Africa.[8]

---

[7]The results also suggest that openness and private investment are weakly exogenous, which indicates that they have influenced TFP but not vice versa.

[8]The positive policy and institutional changes include greater macroeconomic stability, which is attributable largely to disciplined fiscal and monetary policies; stronger and more transparent domestic institutions; and the successful political transition after apartheid.

Table 2.2. Factors Affecting TFP Growth, 1980–2001
(In percent)

	1980–93	Post-1994
Share of trade in real GDP	34.2	46.6
Share of equipment and machinery in investment	35.4	50.4
Share of private business sector in investment	60.1	72.1
Share of private business sector in investment in equipment and machinery	61.8	73.1

Source: Arora and Bhundia (2003), based on data from Statistics South Africa.

From a sectoral perspective, South Africa's growth rate is correlated with fluctuations in world commodity prices, but the association has diminished over the time as the economy has become more diversified. Primary production, chiefly mining, accounts for 10 percent of South Africa's GDP. The correlation coefficients between GDP growth and both nonfuel commodity prices and metals prices were just over 0.5 for the period 1980–2003, but they have fallen since the mid-1990s.

Potential Output

It is instructive to assess growth developments in terms of potential output, estimates of which have a variety of uses in macroeconomic policy formulation.[9] The output gap (measured as the difference between actual and potential output) can be an important input for monetary policy decisions as it provides an indication of the intensity of resource utilization and inflationary pressures. The gap can also be used for gauging the stance of fiscal policy in a cyclical context through its role in the calculation of structural measures of the fiscal balance. Measures of potential output are intended to capture the level of output that an economy can produce based on the available factors of production (labor and capital) and the efficiency with which they are combined (TFP).

Since estimates of potential output are subject to considerable uncertainty, it is preferable to use several alternative estimation techniques rather than rely on any single technique. Three commonly used techniques for estimating potential output are (1) a Hodrick-Prescott (HP) filter, (2) a structural vector autoregression (VAR) that uses information on inflation developments to distinguish between permanent and transitory movements

[9]Relatively little work exists on potential output in post-apartheid South Africa. De Jager and Smal (1984) provide estimates for an earlier period, and Arora and Bhundia (2003) provide more current estimates.

Table 2.3. Estimates of Potential Output Growth Rate
(In percent)

	Average for the Period	
Method	1981–94	1995–2003
Production function	1.0	3.0
Structural VAR[1]	1.1	2.8
Hodrick-Prescott filter	1.3	2.6
Memorandum item:		
Actual GDP growth rate	1.2	2.9

Source: Author's estimates.
[1]Arora and Bhundia (2003) for 1980–93 and 1994–2001, respectively.

in output, and (3) a production function approach based on the assumption of a Cobb-Douglas functional form with constant returns to scale.[10]

An HP filter derives a "trend" output such that it minimizes a weighted average of the output gap and the rate of change in trend output. A weakness of the HP filter is that the end points of the estimated trend output series tend to be sensitive to the last few observations in the sample. In the structural VAR approach, permanent (trend) output is driven by supply shocks while transitory fluctuations are driven by demand shocks. Following Blanchard and Quah (1989), supply shocks are assumed to have a long-run impact on output, but not on prices, while the opposite is true for demand shocks. A drawback of potential output estimates based on statistical time trend techniques, such as HP filters and structural VARs, is that they do not have an economic basis because they are not related to the available factors of production. In contrast, the production function approach explicitly models output in terms of the factors of production and TFP, following a well-known procedure.

The production function approach and the two statistical detrending techniques all suggest that the growth rate of potential output picked up substantially after 1994 (Table 2.3). Both the production function approach and the structural VAR indicate that the average growth rate of potential output rose from around 1 percent in 1980–94 to 3 percent in 1995–2003. The pickup mirrors the increase in the average actual rate of growth during the period. The HP filter implies a somewhat smaller increase in growth although, as noted, the approach may suffer from biases.

Output Gap and Inflation

The output gap is defined as the difference between actual and potential output. The level of potential output can be measured by applying the

---

[10]See Arora and Bhundia (2003) for a discussion of the alternative measures, and U.S. Congressional Budget Office (2001) for a detailed discussion of the production function approach.

Figure 2.1. Potential Output and the Output Gap
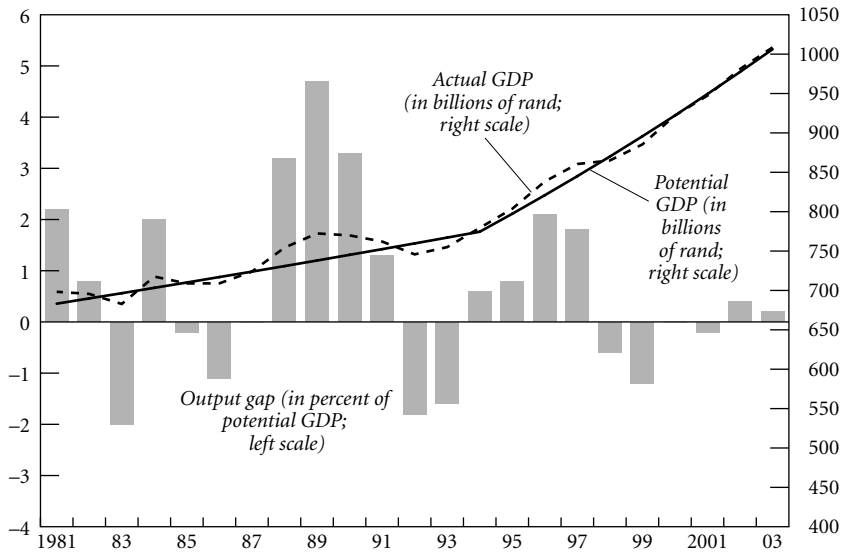
Source: South African Reserve Bank.

estimated potential growth rate to the level of actual output in a base year in which output is judged to have been around its potential level based on other indicators of resource utilization. Real GDP appears to have been close to its potential level in 2000, as evidenced by low rates of inflation and a capacity utilization rate that was close to its long-run average. Estimates of the output gap based on the production function approach imply a small positive gap in recent years (Figure 2.1).

Output gap estimates can be useful for macroeconomic policy formulation because they are indicators of inflationary pressures. (A negative gap is associated with a reduction in such pressures.) In South Africa, the estimated output gap is in fact reasonably closely correlated with other indicators of the intensity of resource use, such as inflation and capacity utilization.[11]

---

[11]Moreover, Arora and Bhundia (2003) find a statistically significant relationship between the output gap and changes in inflation. Simple correlations indicate a positive relationship of the estimated output gap with changes in CPI inflation with a one-year lag, and with deviations in manufacturing capacity utilization around a long-run average.

The Growth Outlook

While near-term growth prospects can be assessed on the basis of potential output, since output cannot deviate from its potential level for very long in the near term, long-run growth prospects depend importantly on policies and institutions that influence TFP growth, employment, and investment. A range of scenarios can be envisaged based on alternative patterns for employment, investment, and TFP.[12]

If recent TFP growth rates (1 percent) are maintained and the unemployment rate is steadily reduced by 10 percentage points by the end of the decade relative to its 2002 level, then annual real GDP growth could reach about 5½ percent, or 3½ percent in per capita terms (Table 2.4). The exercise assumes that investment absorbs rather than displaces labor, which would be the case if labor costs were to decline relative to capital costs.[13] However, if labor market reforms are weakly implemented so that employment growth is only equal to its average level during 1994–2002, then GDP growth would remain below 3 percent and unemployment would not come down. The scenarios highlight the importance of taking structural measures (such as improving skills and reducing labor market rigidities) that help to reduce unemployment and, in turn, raise growth.[14] The growth outlook is subject to several downside risks. Growth could fall in the future if HIV/AIDS substantially limits the expansion of the labor force. In addition, the growth outlook depends on a continuation of the sound policies that have supported the strong rates of TFP growth in recent years.

Although the estimates suggest a wide range of possibilities for long-run output growth, they clearly indicate that there is scope for growth to increase to substantially higher levels provided that a strong effort is made to enhance job skills, ease labor market conditions, and thereby raise employment. In addition, the outlook depends crucially on maintaining high rates of TFP growth, which in turn is related to continued progress in the direction of maintaining macroeconomic stability, strengthening institutions, increasing the scope for market-based activity through public

---

[12]The scenarios assume the same Cobb-Douglas production function that is used in the rest of the chapter.

[13]The calculation implies a decline in the capital-labor ratio. Investment that simply increases the capital-labor ratio from already high levels would result in temporarily higher GDP growth, but this would be unsustainable in the long run and it would not be enough to reduce unemployment.

[14]This approach is more likely to be successful than an alternative approach of waiting for growth to increase in the absence of such measures and thereby to reduce unemployment.

Table 2.4. Unemployment and Growth Scenarios[1]

	2003	2004	2005	2006	2007	2008	2009
Scenario 1 (employment growth exceeds labor force growth by 2 percentage points)							
Unemployment rate	28.9	28.8	27.3	25.7	24.0	22.3	20.6
GDP growth rate	2.8	3.7	5.1	5.2	5.3	5.4	5.5
Capital-labor ratio	182.2	183.8	182.4	181.3	180.6	180.3	180.3
Scenario 2 (employment growth equal to its average level during 1994–2002)							
Unemployment rate	28.9	28.8	30.8	31.0	31.2	31.4	31.6
GDP growth rate	2.8	3.7	2.9	2.9	2.9	2.9	2.9
Capital-labor ratio	182.2	188.6	188.6	188.6	188.6	188.6	188.6

Source: Author's calculations, based on GDP, labor, and capital data from Statistics South Africa.
[1]Both scenarios assume that TFP continues to grow by 1.3 percent each year.

enterprise reform and trade liberalization, and expanding private sector participation in the economy.

References

Arora, V., and A. Bhundia, 2003, "Potential Output and Total Factor Productivity Growth in Post-Apartheid South Africa," IMF Working Paper No. 03/178 (Washington: International Monetary Fund).

——— , and G. Bagattini, 2003, "Potential Output and the Sources of Growth," in *South Africa: Selected Issues,* IMF Country Report No. 03/18 (Washington: International Monetary Fund).

Blanchard, O., and D. Quah, 1989, "The Dynamic Effects of Aggregate Demand and Supply Disturbances," *American Economic Review,* Vol. 79, No. 4, pp. 655–73.

De Jager, B., and M.M. Smal, 1984, "Potential Gross Domestic Product of South Africa," South African Reserve Bank, *Quarterly Bulletin,* No. 154 (December), pp. 21–27.

De Wet, G., 1995, "The Prognosis for Growth and Development in South Africa," *South African Journal of Economics,* Vol. 63 (December), pp. 473–88.

Easterly, W., 2001, *The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics* (Cambridge, Massachusetts: MIT Press).

Hodrick, R., and E. Prescott, 1997, "Postwar U.S. Business Cycles: An Empirical Investigation," *Journal of Money, Credit and Banking,* Vol. 29 (February), pp. 1–16.

International Monetary Fund, 1998, "Growth Accounting," in *South Africa: Selected Issues,* IMF Country Report No. 98/96 (Washington).

Jonsson Gunnar, and Arvind Subramanian, 2001, "Dynamic Gains from Trade: Evidence from South Africa," *IMF Staff Papers,* Vol. 48, No. 1 (December), pp. 197–224.

Sarel, M., 1997, "Growth and Productivity in ASEAN Countries," IMF Working Paper No. 97/7 (Washington: International Monetary Fund).

South African Reserve Bank, 2003, *Quarterly Bulletin* (March), p. S–147.

Strydom, P.D.F., 1995, "International Trade and Economic Growth: The Opening Up of the South African Economy," *South African Journal of Economics,* Vol. 63 (December), pp. 556–76.

United Nations, 2002, *World Urbanization Prospects: The 2001 Revision* (New York).

U.S. Congressional Budget Office, 2001, "CBO's Method for Estimating Potential Output: An Update" (Washington).