Economic Growth in South Africa since the late nineteenth century

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Abstract

1 Introduction

Rereading D Hobart Houghton's *The South African Economy* (1967) and *Economic Development 1865-1965* (1971) brings to mind the stark theoretical and empirical differences between his account of thirty years ago and current views of economic growth. Hobart Houghton wrote within the optimistic and conceptually quite simple framework of W W Rostow's five stages of economic growth – only get to 'take off' and your economic future is assured – whereas analysis of economic growth now draws on a more extended and technical literature which comes to no such simple conclusion. Hobart Houghton was writing after three decades of sustained growth in real per capita income; since then an extended period of falling real per capita income has inscribed itself on the South African record (see Figure 1), during a period of political instability and change. Hobart Houghton wrote in the Bretton Woods world which had gathered to itself a sense of stability: we are more uncomfortably aware that international trade and finance regimes have changed several times since the middle of the nineteenth century, usually with sharp and widespread transition costs. And thirty years ago, comparative information on economic growth was limited to a small (and biased) sample of countries. As more and more countries are brought within the scope of the World Bank's *World Development Report*, for instance,it has become apparent that middle income countries (of which South Africa is one) can regress economically just as easily as they can progress. Governments and peoples now understand themselves as engaged in the elusive quest for economic growth.[1]

These observations are used to structure the exposition in this chapter. First, modern economic growth theory is delineated in order to define what is to be looked for in the historical record. Not all the issues are intuitively obvious, nor are they entirely settled within the economics literature. Moreover, the recent literature on growth is massive and investigates the impact of a great many variables on economic growth. Constraints of space and information confine this analysis to the following core issues:

- the determinants of investment and hence of the trajectory of capital accumulation
- growth accounting, i.e. the relative contributions of employment, capital stock and technological change on growth
- the contribution of human capital to growth

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[1]The title of an influential book by William Easterly (2001).

- the contribution of the financial sector and foreign capital flows to growth
- monetary and fiscal policy: the demand side of growth
- the impact of governance and institutions on growth
- the functioning of the labour market and its impact on growth

Secondly, the international economic environment has influenced the pattern of South Africa's economic development, strongly at times, so there is a brief description of the four main international trade and financial regimes under which South African development since 1870 has taken place. Thirdly, a narrative of the key aspects of the South African growth record is provided, using the international trade and financial regime periodisation. Fourthly, there is an examination of econometrically based evidence of the determinants of South African growth since 1945. A conclusion follows.

There are important omitted issues. One is the relationship between inequality and growth in South Africa. This is omitted partly because of limited and not very reliable information on South African inequality and partly because there is no certainty about the relationship between inequality and growth from theoretical arguments or empirical evidence. The consensus from the empirical work of the 1990s was that there is a negative relationship between inequality and economic growth, but a careful recent study has concluded that, in the short and medium term, an increase in a country's level of inequality has a significant positive relationship with subsequent growth.[2] A second omitted issue is the relationship between social capital and economic growth. And there are many others.

Figure 1 shows the evolution of real per capita GDP (in 1990 prices) and growth in real per capita GDP between 1925 and 1999. This is much of what we set out to explain.

2 Core developments in the theory of economic growth[3]

Modern economic growth theory starts with contributions by Harrod (1939) and Domar (1946). They used a fixed proportions production function with no possibility of substitution between capital and labour. Except in a special ('knife edge') case, growth has the consequence of perpetual increases in either unemployed workers or unemployed machines.

However, the reference point of post-war growth theory is provided by two independent contributions by Solow (1956) and Swan (1956), which came to shift the terms of the debate. Whereas the 1930s posed pressing questions surrounding the possibility of growth and accumulation in the presence of the unemployment of at least some factors of production, the post-war focus shifted to the conditions for balanced economic growth, in the presence of full employment of all factors of production.

The elegant simplicity of the Solow-Swan theory is one explanation for its continuing influence. Another is that the model illustrates clearly the three core building blocks of any theory of economic growth, viz. accumulation of physical capital, employment of labour, and technological progress.

Subsequent contributions to the theory of economic growth can be understood either as variations on our understanding of these three contributors to economic growth, or as extensions of the growth framework in order to incorporate additional determinants of economic development.

2.1 *Placing investment in physical capital stock centre stage*

The departure point of the Solow-Swan model was the observation that a number of core growth rates and ratios in developed economies remained remarkably constant over long periods of time.

[2] Forbes (2000): 869

[3] The discussion that follows draws on a number of sources, notably Fedderke (1997, 2002). The authors thank *Theoria* for the permission to use the material for this presentation.

The proportional growth rates of labour hours and of the capital stock both appeared constant over the long run. Since the growth rate in capital exceeded that of labour hours by a small constant magnitude, labour productivity in turn manifested a stable upward trend (subject to cyclical displacement), while the capital-output ratio and the profit rate remained constant over time.

Such empirical regularities over the sample of developed economies for which data was available were not compatible with the Harrod-Domar framework. Under the Harrod-Domar conception of growth the balance between factors of production and output observed by Solow-Swan would have been achieved by mere chance. The resolution of this apparent puzzle under the Solow-Swan approach was achieved by the abandonment of the crucial Harrod-Domar assumption that factors of production could be combined only in fixed proportions. Instead, capital and labour were deemed substitutable under technology that manifested constant returns to scale, and diminishing marginal returns to all factors of production. Given only a constant exogenously determined growth rate in the labour force (due to relevant demographic mechanisms, say),[4] and savings proportional to output that are necessarily invested in physical capital stock (due to the presence of a financial sector intermediating between savers and investors),[5] it then follows that the economy will manifest a steady state toward which it will necessarily converge. At low levels of physical capital accumulation, a high marginal productivity of capital creates an incentive to invest, thus raising the capital-labour ratio and labour productivity. Falling marginal product of capital ensures both a rise in the capital-output ratio, and a declining incentive to invest, until a point is reached at which the full savings (and hence investment) generated by the economy are employed simply in order to supply new labour hours entering the workforce with the same capital intensity as existing previous labour hours available for production.

In this steady state or equilibrium growth path of the economy the capital-labour ratio and labour productivity (per capita output) would become constant, and capital, labour and output would all come to grow at the constant natural growth rate predicted by the growth rate in labour hours, and the economy would manifest the stylized facts that motivated the Solow-Swan theoretical departure from Harrod-Domar in the first instance.

What should be clear is that the long run development of an economy is essentially attributable to the capital accumulation that is realized. More capital translates into higher labour productivity, though at a declining rate. Even in the modern growth literature which has come to explore more diverse drivers of economic growth, there remain strong proponents of the position that investment in physical capital stock remains the heart of the matter.[6]

Only three means would enable an economy to alter the Solow-Swan constants of long run economic development. First, raising the savings rate of the economy would raise the proportion of output available for capital accumulation, and would enable a higher capital-labour ratio to be attained, with the attendant realization of a higher per capita output. Second, a lower growth rate of the labour force would allow the use of investment for the purposes of capital deepening rather than capital widening, and again the consequence would be a rising capital-labour ratio and higher

[4] One complication for the theory is that over the course of economic development the growth rate of the labour force may come to decline. Empirical evidence suggests that the demographic transition is related to the level of per capital output – see for instance Maddison (1987). The implication is that the economy may face multiple equilibrium growth paths, of which some may constitute low-level equilibrium traps. Full discussion of this issue is beyond the scope of our paper.

[5] The assumption of a proportional savings rate may appear to imply a crude theory of savings that would carry the need for strong qualifications of the steady state behaviour of the Solow-Swan model. It is possible to show that this is not the case. Under assumptions of classical savings behaviour such that savings are a function of the profit rate (see Branson (1989)), or Kaldor (1955-56, 1963) savings under which "capitalists" and "workers" maintain differential savings rates, or Ando-Modigliani (1963) life cycle savings behaviour, it is possible to show that the steady state characteristics of the economy are unchanged except in some extreme (and hence unlikely) instances.

[6] Good illustrations are provided by De Long and Summers (1991, 1993). Easterly (2001) infers from the Solow-Swan model that *only* technological progress is relevant to long run growth. But this is true only if all economies are in steady state. During the period of transition of an economy to steady state, the rate of capital accumulation remains important.

labour productivity.

Both changes in the savings rate and changes in the growth rate of the labour force would only result in a temporary change in the growth rate of output, as the economy moves to the new steady state defined by the new savings rate or labour force growth rate. In steady state the natural growth rate of the economy would again prevail. The only means of permanently accelerating the growth rate of output under the Solow-Swan model is through technological progress. Where innovation is consistently able to improve the productivity with which existing capital and labour time is employed in the generation of output, per capita output is able to grow indefinitely also.

2.2 *The impact and determinants of technological progress: exogeneity vs endogeneity*

The central role of technological progress in economic growth was recognized both empirically[7] and theoretically[8] from the outset in the post-war debate. Early treatment of technological progress treated the innovation process as exogenous (or at least as beyond the scope of economic analysis), and focused instead either on the innovation's impact on factor intensity (labour-saving, capital-saving, or neutral), or on the implications of the embodiment of technological innovation in new investment instead of the entire stock of capital in the economy.[9]

Of course, as long as the source of technological progress is treated as exogenous to economic analysis, there is little to add to it. Such an outcome is vexing particularly where it is found that innovation is an important contributor to economic growth over and above capital accumulation. The upshot would be that economics has less to add to our understanding of growth than one might have thought. The embarrassment is even more acute when one notes that the empirical data that became available over the post-1960 period on the economic performance of a wide range of newly independent developing nations appears to point to the importance of technological progress.[10] One response to the embarrassment is to endogenize technological progress, rendering economic theory more comprehensive.

A large number of contributions to endogenous technological progress have emerged since the reinvigoration of the growth debate in the mid 1980's. In presenting these contributions we present a number of classes of models that can serve to structure one's understanding of the endogenous growth literature. Before doing so, it is useful to bear in mind two qualifiers. First, the central idea that underlies all of the endogenous growth literature is fairly straightforward. It rests on the proposition that technological progress takes place because resources are devoted to it – either intentionally in the case of Schumpeterian approaches, or inadvertently through knowledge spill-over processes. Second, one should bear in mind that while endogenous technological progress came to prominence in the 1980's, a number of earlier contributions to the literature on economic growth had advanced similar propositions, and explored their implications in some detail.[11] For a fuller non-

[7] Abramovitz (1956) famously established that employing the growth accounting framework implied by Solow-Swan, would leave approximately 75% of output growth unaccounted for by factor accumulation, and hence by implication due to technological progress. While the work of Denison (1962), Jorgenson et al (1967, 1987, 1988), Grilliches (1979) amongst numerous others lowered the growth attributable to technical change, the point remained germane.

[8] See for instance Solow (1957, 1959).

[9] See Solow (1959) and Nelson (1964). Hulten (1992) provides a more modern perspective including on the empirical importance on the embodiment debate.

[10] See for instance the synoptic discussion in Romer (1994). The point is that one of the empirical implications of the Solow-Swan model is that once differences in investment and labour force growth rates between countries have been taken into account, they should converge to a common per capita level of output. While the empirics are contested, it turns out that at least arguably economies are diverging, even when a whole range of additional growth determinants have been accounted for. The famous explanation of Romer (1986) is that this is due to the fact that the technology of production is subject to increasing rather than decreasing returns to scale. Variations on the theme are now myriad. We deal with some of the seminal contributions.

[11] Besides the classic contributions of Schumpeter (see for instance the beautifully concise 1943: Chapter VII, and also 1912), Arrow (1962) effectively provides the theoretical foundation to Romer (1986), which in turn arguably sparked the endogenous growth debate. Further important contributions came from Shell (see for instance 1966)

technical discussion of new growth theory and its relation to human capital investment see Fedderke (2002).

2.2.1 *Endogenous technological change: knowledge spill-over effects, or learning by doing*

New growth theory received perhaps its most often cited impetus through the work of Paul Romer. The argument presented in Romer (1986) introduced the possibility that the very process of being engaged in a productive activity generates learning effects, by allowing those who are engaged in productive tasks to become more efficient at performing them.[12]

The Romer-1986 proposition in fact has two important components: the process of learning-by-doing, and the view that such learning will be available to all firms in an industry. To the existence of learning-by-doing is added the additional presumption that any knowledge gains obtained from the process of production and investment cannot be internalized by the firm in which that knowledge-creation takes place. Thus the learning spills over to become available to all labour, and all producers in the economy.[13] With spill-over effects, the suggestion is that knowledge production is an inadvertent side-product of all production and investment activity, and would thus take place whether firms wish to undertake it or not, as long as they are engaged in their standard productive activity.

The effect of knowledge spill-over is to ensure that the efficiency of the labour input at the social level will improve. The consequence of this is that the production function comes to show increasing returns to scale at the social level (because of constant social returns to capital).

The crucial difference between the Romer-1986 growth model and traditional growth models relates to the nature of the capital stock in the economy. Once social returns to scale in capital are constant, it immediately follows that the marginal product of capital becomes constant also. As a consequence, in the Romer model the incentive to invest does not change with a rising capital labour ratio, since the marginal product of capital and hence the profit rate is constant. As a consequence, there is no reason for economic growth to ever "slow down" once it has started. This stands in stark contrast to the depiction of the growth process under Solow-Swan we encountered above.

One advantage of the Romer model is that it is able to account for the failure of poor countries to catch up with rich countries. Since the incentive to invest does not decline with rising per capita capital stock the growth rate of the capital labour ratio and of per capita output does not change either. As a consequence, there is no reason why countries which have high per capita output should grow any slower than countries which have low per capita output, such that there is no inherent tendency toward catch-up as is present in traditional growth models – indeed the absolute gap between rich and poor countries may increase over time.

However, it is important to realize that the source of the non-declining incentive to invest in Romer-1986 models arises due to knowledge spill-overs, which ensure a non-declining marginal product of capital. Such a perfect public good characteristic of technology is a strong assumption to invoke – and as Dasgupta and Stiglitz (1988) demonstrate, even partial excludability of the knowledge spill-over effects has the effect of destroying the unbounded growth result. Moreover, not only are knowledge spill-overs *within* countries potentially imperfect, but Barro and Sala-i-Martin (1995) demonstrate that while capital and technology may move between regions, the rate of diffusion is not instantaneous, but takes time. Hence the public good characteristic of technology on which the central Romer-1986 result relies, is at least questionable.

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amongst others.

[12] For some useful reflections on some potential limitations that attach to Romer's twist on Arrow (1962), see Solow (1997). Solow extends the discussion to a case in which learning by doing is bounded. On a prior approach to bounded learning by doing see Young (1993).

[13] An illustration of the potential significance of spill-overs is given by Landes (2000). Contrast the strong attempts to control the dispersion of knowledge concerning the construction of time pieces in China (2000:30), and the effects of the strong guilds in much of Europe (2000:222ff), with the relatively free circulation of ideas and expertise in Britain (2000:231f). Britain won the ensuing contest.

A second limitation of the Romer-1986 approach is that technological progress, while technically endogenous to the model, remains essentially unexplained as an intentional activity on the part of economic agents. What has changed from traditional growth theory is that technological change has an explicit origin (in investment in physical capital stock). But in another sense technological change continues to "just happen" as a by-product of intentional activity directed not at technological change itself, but at a quite different productive activity. The expectation is of a reward not from technological change *per se*, but from the act of investment in physical capital. Even the most cursory consideration devoted to the advancement and transmission of knowledge both by the public sector (see universities for instance) and the private sector (R&D expenditure of pharmaceutical and software companies, for instance) is an indication of the fact that such an understanding of the source of technological progress must have strong limitations. Indeed, any pure public goods conception of knowledge will struggle to account for intentional private sector allocation of resources to the advancement of knowledge.

Nevertheless, to the extent that Romer-1986 is accepted, it carries with it the clear policy implication that private investment requires government subsidy. Since private investors cannot internalize knowledge spill-overs, private marginal returns to investment will be lower than the social marginal return, such that private investors will under-invest in physical capital from a social perspective.

2.2.2 *Endogenous technological change: the intentional creation of new knowledge through research and development*

The obvious question to ask is: how to treat the production of new technology as an intentional human activity? One answer to this question is the theme of the Schumpeterian tradition in economic growth theory.[14] There exist a number of important contributions within this broad approach, including those by Romer (1990), Grossman and Helpman (1991), and Aghion and Howitt (1992). Here we follow Romer (1990), since it serves to illustrate some important generic features of such models.

The crucial theoretical move is that knowledge is no longer treated as a (pure) public good. Instead, knowledge is treated as a mixed good, with both public and private good characteristics. The assumption is now that technological change has Schumpeterian characteristics, in the sense that agents consciously engage in technological change and innovation, responding to market incentives as they do so, and the only reason they do so, is that they are now in a position to internalize positive net marginal benefits from undertaking innovative activity.

On the other hand, knowledge is not held to be a pure private good either, in the sense that to some extent it will be non-rival.[15] Once it exists, the marginal cost of allowing another agent to use that knowledge would be zero. However, since access to knowledge is excludable, agents who have control over knowledge will no longer be price-takers, but have monopoly power over the innovations they initiate. In effect we will have monopolistically competitive markets in the economy. The consequence is that the social marginal return to knowledge will exceed the social marginal cost of knowledge, and again the private sector will under-invest in knowledge. In contrast to the knowledge spill-over model though, where the policy prescription was for production and investment subsidies, here the policy implication will be for subsidies to the production of knowledge.

In the full Romer (1990) model the economy produces research output, intermediate goods (capital) as well as final output for the purpose of consumption. For our present purposes we can focus

[14] See Schumpeter (1943: Chapter VII) as an often cited starting point.

[15] In order to understand why knowledge might have both private and public good characteristics, we can distinguish between two different forms of knowledge. The first, *human capital*, is both rival and excludable, hence strictly private. The second, *technological design*, is non-rival, since once created a design could be made available to other potential users at zero cost. On the other hand it is excludable, in the sense that private, profit-maximizing firms will seek to keep exclusive use of any design innovations they have funded. Such excludability may take the form of trade secrets guarded from industrial espionage, and more formally patents forcing any user of a design innovation to pay for its use.

on the relatively simple process governing the production of research output. Production of design output (new technology) uses simply human capital and the accumulated stock of human knowledge, the sum of all previous designs in existence. We can "know" patents, and in particular the principles and insights that they embody, even where we are excluded from actively using them in production. As such, the principles and insights embodied in patents are available to researchers to further their production of knowledge.

Production of knowledge then depends simply on the accumulated stock of already existing knowledge, the human capital devoted to research, and a research success coefficient.

We should note two important elements to this statement. The first is the explicit use of human capital in knowledge creation. The second is that this human capital is explicitly devoted *to* knowledge creation, rather than inadvertently as a by-product of some other undertaking (such as final goods production). As the Romer model makes explicit, the human capital resources could equally well have been used for the purposes of producing final output. Knowledge accumulation depends *both* on agglomeration effects (in already existing knowledge) *and* on the resources (of the specific human capital variety) devoted to knowledge accumulation. Technological advance takes place not because of "money" being thrown at the problem. The requirement is for focused deployment of the very specific resource of human capital being devoted to it.

The model goes on to demonstrate that under these circumstances, the growth in output in the long run will come to equal the growth rate in technology. Since human capital can be used either in the production of new technology or in the production of final output, this implies that the more human capital is employed in final goods production rather than "research" into the advancement of knowledge, the lower will be the long run growth rate of output in the economy. Long run growth depends immediately on the stock of accumulated knowledge, on the human capital devoted to research, and on the effectiveness of the human capital engaged in the research.

2.2.3 *Providing a counterpoint to endogenous growth theory by extending Solow-Swan: a direct impact of human capital?*

One of the implications of the endogenous growth literature is the introduction of human capital into the analysis, particularly through its contribution to the innovative activity of the research sector of the economy. One advantage of the introduction of human capital is that increasing returns to scale in production technology can be realized, and hence the possibility of unbounded growth provides an explanation of the empirical observation of divergence between rich and poor countries.

An alternative approach to the role of human capital in growth is to introduce human capital directly into the production function as an additional factor of production, while maintaining constant returns to scale in production technology. Under these circumstances the introduction of human capital does not have unbounded growth as a consequence. Mankiw, Romer and Weil (1992) suggest that the introduction of human capital into a Solow model is justifiable, indeed desirable, since by 1969 in excess of 50% of the capital stock of the USA took the form of human rather than physical capital stock. Moreover, they argue that the introduction of human capital into the Solow model successfully enhances its explanatory power to such a degree as to preclude the necessity of resorting to endogenous growth models.

The implication Mankiw et al draw from their empirical results is that the human capital augmented Solow-model, despite its simplicity, accounts for a significant proportion of cross-country variation in per capita output. They argue that the strength of the empirical evidence has to be accepted as forceful evidence in favour of the model - and that recourse to endogenous growth theory, given all the complexity it often introduces, may simply not be necessary. Differences in per capita output between countries on this explanation would be due simply to differences in their endowments of physical and human capital.

2.3 *Further reflections on endogenous growth theory*

In an extension of the spill-over approach to endogenous growth, Lucas (1988) proposed a production function in which production is constant returns to scale, but in which the possibility of increasing returns is introduced through the impact of the generally available human capital. In a Lucas (1988) model one can show that the final growth rate of the economy will be determined by the rate of growth of human capital creation. Moreover, growth will turn out to be unbounded even in the absence of increasing returns to scale, because of the implied growth in the effective labour force of the economy due to investment in human capital. The result is analogous to the unbounded growth due to technological progress in traditional theories of economic growth, but now with an explicit recognition that the motor force behind this growth is human capital formation.

Where we also have increasing returns to scale in production an additional implication is that the rate of return to human capital will prove to be highest where it is most abundant. In the presence of labour mobility, the implication is that labour well endowed with human capital will migrate to centres already intensive in human capital, because the rewards of doing so are large.

The policy implications for developing countries are profound. It implies that if a country is behind in the accumulation of human capital it is likely to remain forever behind. Countries ahead in the growth race will steadily out-accelerate any lagging country due to the increasing returns in human capital. Worse, if a developing country tries to rectify matters by improving investment in human capital, such human capital is simply likely to emigrate. The situation for poor countries is doubly perverse. They are poorly endowed with human capital. But the policy intervention designed to rectify the situation – increasing saving in order to be able to invest in education - merely serves to benefit the already rich.

Thus if human capital matters for growth, and if increasing returns to human capital are present, poor countries face the tough task of having to keep the environment for skilled people at home even more attractive than otherwise would have been the case. Policy intervention must be conscious of the need to improve the incentive for human capital to stay, rather than leave.

Increasing returns to scale in human capital may lead to perverse international allocation of human capital. But this unfortunate international allocation of human capital may well be exacerbated by a further counterproductive intranational human capital allocation. Under the Romer (1990) conception of the interaction between growth and technology, we have a sector dedicated to the creation of knowledge using human capital as an input, but with human capital also used in the production of final output. The difficulty for developing countries is that at low levels of human capital accumulation, there may simply not be the critical mass of human capital to generate sufficient returns from the pursuit of new knowledge. As a consequence human capital will come to migrate to final goods production rather than new knowledge production, because the return to human capital in final goods production is higher. The net result is a permanent decrease in the developing country growth rate, while developed nations with higher agglomerations of human capital will be able to take advantage of higher growth rates due to their ability to create new knowledge on the back of higher concentrations of human capital devoted to knowledge creation.

Thus developing nations are potentially caught in two vicious cycles that result from the impact of human capital on long run economic performance. The one results in an unfavourable international allocation of human capital away from developing nations to developed nations. The other ensures that what human capital remains in developing nations may not be allocated to where it has the most dramatic long term impact.

2.4 *Augmenting our understanding of growth: other factors*

Thus far our exposition of growth has focused on physical capital and innovation, including the impact of human capital on long run development. It would be surprising if this was all that mattered to accumulation. A range of additional factors has been identified as drivers of economic

growth. In what follows we list some of these, though space constraints preclude a comprehensive exposition.

2.4.1 *The role of financial capital and the financial system*

The first additional determinant of growth we introduce is financial capital. Identification of financial capital as a growth determinant emerged out of a debate surrounding the role of the financial system in the economy.[16]

Some economists have argued that the financial system could be an inhibitor to development, since savings of the economy could be placed in the financial system without being transmitted onward to investors for the purposes of augmenting the physical capital stock of the economy.[17] The net effect would be to lower the effective savings rate in the economy. The ultimate impact would be to lower the per capita capital stock and output of the economy. The policy prescription of this line of reasoning was financial repression: taxing money holdings in order to force savings to be transmitted onward to investors.

The argument in favour of financial repression has always been controversial, for two reasons. The first is that money balances may themselves be a productive asset used in the process of production, particularly in less developed countries where credit systems as means of insuring against cash flow constraints are poorly developed.[18] Under the view of money as a productive rather than idle asset, money will allow the economy to realize a higher level of per capita output than in its absence. Hence, the financial repression policy prescription to emerge from the Tobin model serves to actively damage one of the productive factors of production, severely harming the growth prospects of the economy.

The second reason relates to the function of the financial system in the economy. The financial system is constituted by the interaction of savers and investors in the economy, and operated by financial intermediaries who facilitate the transactions that take place between lenders and borrowers in the economy.[19] In doing so, the financial system and the financial intermediaries that operate within it have the effect of lowering transactions costs of lending or borrowing: information and search costs are lowered, risk is transformed (lowered) and the maturity structure of debt is transformed to the benefit of both lenders and borrowers. The point is quite simply that given the efficiency-enhancing effects of the financial system on both lending and borrowing, it is difficult to understand how or why the presence or operation of the financial system should have a growth inhibiting effect on the economy.[20] Indeed, proponents of financial deepening suggest that far from

[16] For a fuller discussion of the issues raised in this section, see Kularatne (2002).

[17] Tobin (1965, 1967) provides the theoretical justification for financial repression. In this model, disposable income may either be consumed or saved. It is argued that with the introduction of money balances, agents may either allocate savings by investing in physical capital stock (as in Solow-Swan) or to real money balances. Agents are therefore able to intertemporally transfer value either in the form of physical capital, or by increasing their real money balances in the present period, thereby increasing their purchasing power in future time periods. Two assets now exist in the economy - physical capital and real money balances. The net effect of money in the Tobin Model is to decrease the effective rate of savings available for the augmentation of the physical capital stock. Instead of being exclusively available for allocation to investment, savings come to be allocated to idle money balances instead – at least in part. As a result the per capita level of physical capital, and hence labour productivity in steady state will come to be negatively affected by the presence of money. The argument is essentially that there may exist a Keynesian liquidity trap in the economy – here properly understood dynamically (see Keynes 1936:351).

[18] For an early expression by way of rebuttal to Tobin, see for instance Levhari and Patinkin (1968). They argue money to be a productive factor of production. Just as production depends on fixed capital, so it depends on *working* capital too. Real money balances constitute the quintessential working capital, and may thus be viewed like any other inventory item that enters into the production process. With the absence of this medium of exchange, the economy would revert to a barter system with its "double coincidence" of wants constraint. The result would be an inefficient use of resources, preventing money from improving the productivity of labour and capital by allowing for greater specialization in their use.

[19] In the tradition of Gurley and Shaw (1955, 1960) and following. A further classic reference is McKinnon (1973). An extended discussion can be found in Fry (1995, 1997), while Levine (1997) provides an overview of the issues.

[20] Financial intermediaries aid investment and economic growth by mobilising savings. They provide lenders finan-

repressing the financial system, policy makers should aim at deepening the financial system as a means of improving long term economic performance.

Empirical evidence has favoured the financial deepening argument. Levine and a number of co-authors find that the degree of development of financial intermediation in the economy is positively related to long term growth performance for a large cross-section of countries. King and Levine (1993b) find that moving from the mean ratio of liquid liabilities of the financial system to GNP of the slowest growing quartile of countries (0.2), to the mean ratio of the fastest growing quartile of countries (0.6), would raise *average* annual growth rates of per capita GNP by 1% (which would account for approximately 20% of the difference in growth rates between the two groups of countries).[21] Levine and Zervos (1996, 1998) add to the findings, by presenting empirical evidence suggesting that financial deepening should include both improvements in financial intermediation, and in the quality of equity markets – the two forms of deepening are complements rather than substitutes.

The international empirical evidence thus favours not only efficient financial intermediation but also the improved liquidity of the stock market as a source of increased levels of per capita GDP. A liquid stock market encourages investment since it enables investors to cheaply, efficiently and confidently trade ownership of claims.[22] The more easily they are able to vary the composition of their portfolio, the less reluctant agents will be to subscribe to new share issues. Levine (1997) incorporates two measures of liquidity - the turnover and value-added ratios. The former is the ratio of total value of shares traded to stock market capitalization (the value of listed shares on the country's exchanges) of an economy while the latter is the total value of shares traded to GDP.[23]

The empirical evidence also suggests that the two generic types of financial systems to be found internationally are complementary. In the Japanese/German style system financial intermediaries play a more prominent role than the stock market in the provision of credit while in the Anglo-Saxon financial system brand the opposite holds. However, the role played by each institution in stimulating growth through the provision of credit may alter as the economy grows. At least one study finds financially more developed economies to have a more securities-based financial system since they also tend to have stronger shareholder rights and higher accounting standards.[24]

The international evidence also indicates that the financial system may have both an indirect and a direct effect on economic growth. The indirect effect is via improvements in the investment rate and total factor productivity.[25]

A final issue that continues to attract attention is the question of the direction of association between the real and financial sectors. In particular, whether financial deepening is simply the consequence of economic growth, or itself stimulates growth. King and Levine (1993a), using post war international data, argue that the level of financial intermediation is a good predictor of economic growth. In such cross sectional studies, however, causal inference is restricted to the observation that economies with greater financial depth at a given point in time, appear to grow faster in subsequent time periods than those with lower initial levels of financial activity. Examining the results of time series studies on the topic may therefore prove to be more useful. One such study conducted by

cial instruments of high quality and low risk, and buy the liabilities of borrowers at lower liquidity, lower yield and a larger principal. See Levine (1997). This enhances the level of savings, investment and thus economic growth. Moreover, since financial markets are faced with information and transaction costs due to the existence of asymmetric information, financial intermediaries reduce the ensuing inefficiencies by acquiring information on the quality of individual loans. In the process of acquiring this information on the quality of the individual risk profile of borrowers, financial intermediaries engage in risk transformation by engaging in portfolio diversification and risk pooling. Therefore, due to the prevalence of asymmetric information in the financial sector, the argument in favour of money as a factor of production in the economy only appears to be viable if a well-functioning financial sector exists (If financial intermediaries are inefficient credit rationing may occur).

[21] And see also King and Levine (1993a, 1993c).

[22] See Levine (1997) and Levine and Zervos (1998).

[23] Though see Levine and Zervos (1998) on the potential pitfalls of the value-traded ratio.

[24] For example see Demirgüç-Kunt and Levine (1999).

[25] For example see Neusser and Kugler (1998).

Rousseau and Wachtel (1998) finds that finance predicts growth with little evidence of feedback from output to intermediation for five industrialized countries from 1870-1929. Jung (1986), however, finds a bi-directional link between the financial and real variables in post war data. The study is unable to disentangle direct effects from feedback effects. Patrick (1966) postulates that the direction of causation changes over the course of development. He argued that the bi-directional relationship present in certain studies may be attributed to financial deepening inducing real innovation-type investment and, "as the process of real growth occurs, the *supply-leading* impetus gradually becomes less important, and the *demand-following* financial response becomes dominant." Although the latest studies favour finance leading growth, Patrick's (1966) argument is borne out empirically by Jung (1986).

The upshot of the evidence seems clear: a robust financial sector, with minimum financial crises, is essential for growth and poverty reduction, with no empirical support for policies that artificially constrain equity markets in favour of credit extension or vice versa.

2.4.2 *The role of economic policy*

An important extension to the debate on the determinants of long run growth performance, concerns the role of demand side policy intervention by government.[26] In the most immediate sense the question appears strange, since growth is concerned with the long run performance of the economy. The expectation would in general be that the long run aggregate supply curve assumes a vertical slope, leaving demand-side intervention largely ineffective. Nevertheless, two considerations render an examination of the role of demand side policy important. First, decades of Keynesian demand side policy management have generated a wide-spread belief that demand side stimulus may lead to an enhanced growth performance. Second, and more importantly, developments in macroeconomic theory have come to highlight the possibility that demand side policy may have either distortionary or efficiency enhancing impacts on the supply side of the economy. The growth performance of the economy may therefore respond to the extent and nature of demand side policy interventions.

Cross-sectional studies (across large samples of countries) of the determinants of economic growth generally find the impacts of both government consumption expenditure and the inflation rate to be negative.[27] A distinguishing feature of these studies is that the policy variables enter the specification linearly. Either of the feasible signs on the policy variables implies a corner solution that seems implausible. Complete reliance on private markets is challenged at least by the literature surrounding the impact of human capital on economic growth. Complete nationalization of the economy is difficult to justify on efficiency grounds. The implied interpretation of the policy variables in growth studies is that they capture piece-wise linearity. A better solution, therefore, would be to recognize the likely non-linearities explicitly.

The idea is that for relatively low levels of government consumption spending and inflation, the impact on the growth rate may be positive but as the ratio of government consumption spending to

[26] For a fuller discussion of the issues addressed in this section see Mariotti (2002).

[27] Barro (1991) and Fischer (1993) found that government consumption expenditure has a negative effect on economic growth. Moreover, it has been shown that government consumption expenditure is negatively related to private investment (Barro 1991), which Levine and Renelt (1992) show to be one of the key determinants of economic growth. Fedderke (1999) shows that private investment and growth are more highly correlated in South Africa than any other form of investment expenditure. Kormendi and Meguire (1985) by contrast find that the mean growth rate of the ratio of government spending to output has a positive effect on GDP growth, although Levine and Renelt find the impact to be negative and insignificant. Grier and Tullock (1989) repeat the work of Kormendi and Meguire on a larger sample of countries, and find both the inflation rate and government consumption expenditure as a proportion of GDP are negatively related to growth. Very few of the studies listed above focus on the effects of monetary policy on growth. De Gregorio (1993) compensates for this by conducting an empirical study, which examines the impacts of various types of monetary measures on growth. The main finding is that average inflation has a negative effect on the growth rate. Finally, Easterly and Rebelo (1993) introduce another aspect of fiscal policy in an investigation of the impacts of the tax rate on GDP growth. The finding is that as the marginal tax rate increases, the growth rate declines. However, as non-tax revenue increases, the growth rate increases thus suggesting the desirability of a low tax rate.

GDP and the inflation rate increase they begin to have negative effects on GDP.

Two papers have examined an alternative suggestion that the relationship between policy variables such as government consumption and inflation rates and growth is non-linear. Barro (1990) develops a theoretical model demonstrating the feasibility of the existence of an optimal level of government expenditure.[28] Mariotti (1992) develops a distinct model with the same implication, and adds an empirical estimation of the relationship to long run South African growth, reporting strong statistical support for the presence of the non-linearity.

The advantage of incorporating non-linearity in the association between economic policy and growth is not only that the theory carries more plausible implications. It would also serve to explain why different studies might have found either positive or negative associations, or indeed statistical insignificance in the relationship. It is simply a question of whether a piece-wise linearity could be legitimately assumed over the domain of the estimation.

2.4.3 *The role of governance*

Once the possibility of heterogeneity of countries in the relatively limited dimensions provided by Solow-Swan type growth models is recognised, the possibility that heterogeneity in other dimensions may be of significance to growth follows readily. We have already seen the level of human capital,[29] the depth of financial development,[30] and the the nature and quality of government intervention in economic processes,[31] introduced as extensions of the basic framework.

Yet even after correcting for a wide variety of additional explanatory variables, many growth equations struggle to account for cross country variation in growth, particularly in Africa and Latin America.[32] Such limitations to growth models has resulted in greater emphasis being paid to the interaction of economic growth with the wider "social" or institutional setting within which economic growth takes place.[33]

Modernization theory postulates a link from economic development to democratisation, such that "good things go together". Political freedom is effectively viewed as a luxury good whose high income elasticity ensures emergence of democratisation only at high levels of per capita income. That the severity of class conflict declines with rising per capita income, and that strong forms of associational life develop as the economy grows, further reinforces the emergence and sustainability of democratic institutions. However, since the postulated causality runs from economic *to* political development, and since the link is viewed as existing between the *levels* of economic and political development, modernization theory in its initial format has little to say concerning the impact of political and social institutions on economic growth.[34]

An extension to modernization theory is thus an investigation of the possibility of a link from political and social institutions to economic growth. One possibility might be that political freedoms might have positive externalities in reinforcing economic freedoms, strengthening both the demand

[28] Despite the possible existence of an optimal level of policy the question remains of whether this level will be reached. There are two issues surrounding the achievement of the precise optimal level. Firstly, public choice theory suggests that such an achievement may be difficult. There is disagreement about the ability and desire of policy makers to achieve the optimum. Proponents of the public choice view argue that macroeconomic policy makers act to maximise their own welfare rather than social welfare. See Tullock (1976) and Buchanan and Wagner (1977). Thus the goals of policy makers are not necessarily consistent with the achievement of social optimality, nor is there necessarily consistency in determining the goals of policy.

[29] See Barro (1991), Mankiw, Romer and Weil (1992).

[30] See King and Levine (1993a,b,c).

[31] See Barro (1990), Fischer (1991).

[32] See for example Barro (1991), and the discussion in Easterly and Levine (1997).

[33] A brief overview of the literature follows. For a more extensive review see Fedderke (1997), and also Fedderke (2001b).

[34] The seminal contribution is Lipset (1959). For further supporting evidence see Bilson (1982), Bollen (1979), Bollen and Jackman (1985), Burkhart and Lewis-Beck (1994), Cutright (1963), Diamond (1992), Helliwell (1992), Inglehart (1997), and Theil (1979).

for and the defensibility of the latter.[35] An alternative proposition might be that externalities are not positive but negative, since democracy at low levels of development is subject to populist pressure for redistributive policies, with negative consequences for savings rates, relative price distortions and uncertainty.[36] If institutions do matter in the determination of economic growth, it follows that where institutions are inappropriate, they will in turn come to inhibit economic growth.[37]

A crucial question concerns the reason for the existence of a link from political institutions to long run economic performance - i.e. just why we might expect positive externalities to be present. One suggestion has been that the credibility of political dispensations is critical if political institutions are to avoid time-inconsistency problems. Time inconsistency emerges when policy makers have an incentive to alter long-term policy commitments at a later stage. Its chief effect is to undermine the credibility vital to maintaining private sector and foreign investor confidence (the argument is analogous to those surrounding the credibility of stabilization policy).[38] Property rights are also frequently identified as the institution of greatest significance to economic growth, lowering uncertainty and transactions costs associated with economic activity.[39] An analogous but broader conception is that of social capital, viewed as consisting of a range of formal and informal cultural practices which increase the probability of cooperative solutions to problems of collective action, and which is again viewed as lowering transactions costs and uncertainty, and hence as beneficial to economic growth.[40]

The basic proposition of a possible link between economic and political development has also received a number of extensions. Thus for instance political instability has generally been viewed as lowering econ omic growth by raising uncertainty, and by reducing the quality of economic policy formulation.[41] However, where political instability disrupts rent-seeking activities it may have a positive impact on growth[42], and some authors have suggested the presence of simultaneity between growth and stability by pointing to the possibility that growth may disrupt traditional social forms.[43] Some studies go further in identifying income inequality as a specific cause of the growth inhibiting political instability or redistributional policies noted in the preceding discussion.[44]

While the literature has gone some way toward introducing a number of distinct links between social and political institutions and economic growth, empirical evidence is as yet inconclusive in the sense that a number of the postulated, but alternative and occasionally contradictory links have found empirical support. Fedderke and Klitgaard (1996, 1998) demonstrated that the presence of strong webs of association amongst social indicators, makes an empirical distinction between the theoretical propositions outlined above difficult. Moreover, it is argued that potential simultaneity

[35] This might be termed the Hayek-Friedman perspective. Empirical evidence in support is provided by Grier and Tullock (1989) and Kormendi and Meguire (1985). The latter find political institutions impact on growth not only directly, but also indirectly via the investment rate.

[36] See the discussion in Landes (1990). Barro (1994) provides empirical evidence in support of a negative impact of democracy on growth, as does Marsh (1979) with qualification, and Weede (1983).

[37] See particularly Mauro (1995), but also Murphy, Schleifer and Vishny (1991, 1993), Rama (1993).

[38] See Borner, Brunetti and Weder (1995), who see credibility as of far greater significance than the level or stability of political rights.

[39] See Knack and Keefer (1995), North and Thomas (1970, 1973), North (1981, 1990), Scully (1988, 1992).

[40] See Coleman (1988, 1990), Putnam (1995) and Fukuyama (1995a, 1995b).

[41] Alesina and Perotti (1993), Barro (1991), Londregan and Poole (1990), Knack and Keefer (1995), all report empirical findings confirming both a direct and indirect (via the investment or saving rate) impact of political instability on growth. See Olson (1993) on the link between political stability and the quality of economic policy formulation. On the link between instability and excessive foreign debt burdens and capital flight see Alesina and Tabellini (1989) and Ozler and Tabellini (1991).

[42] Olson (1982), who argues that (severe) political instability may disrupt the hold of rent-seeking interest groups on the state, and thereby raise economic growth.

[43] See Olson (1963). Londregan and Poole (1990) confirm the presence of simultaneity between economic growth and political instability, but find economic growth lowering instability.

[44] See Alesina and Perotti (1993) and Persson and Tabellini (1994). Clarke (1995) finds not only indirect effects of income inequality on economic growth (such as the investment channel noted above), but a direct negative effect of inequality on growth, for both democratic and autocratic regimes. However, some studies find no systematic relationship at all (see Papanek and Kyn 1986).

between institutional dimensions and economic growth (for which empirical evidence is advanced), circumscribes the reliability of standard statistical estimation results given the present level of theoretical understanding of the link between institutions and economic growth. Our theoretical and empirical understanding of the link between social and political institutions and economic growth is as yet at an early formative stage, in which the relative importance of the various institutional dimensions cited, their mutual interaction, the lags with which they may be said to operate, are all as yet incompletely determined.

3 International monetary, capital flow and trade regimes

The period since the middle of the nineteenth century can be divided into four subperiods as far as the international monetary order is concerned: the international gold standard up to 1914, a period of confusion between 1914 and 1945, the Bretton Woods and fixed rate dollar standard era between 1945 and 1971, and the period since 1971 which saw the rise of a tripolar monetary order based on the dollar, deutschmark and yen, a rapid increase in international capital flows and finally the development of the European monetary system into the eurozone.

The international gold standard, especially with the resumption of convertibility in the United States in 1879, covered all the major industrial economies and most smaller agrarian ones. McKinnon (1993) was able to write down a quite simple set of 'rules of the game' for this period. Each country established a gold price or 'mint parity' and converted freely between domestic money and gold at that price. The set of mint parities established a set of exchange rates. There were no official controls on the movement of gold, and the system was self-regulating. An outflow of gold would lead to higher domestic interest rates, deflation and a corresponding correcting inflow. Equally, an inflow of gold would lead to lower interest rates, stimulation of the domestic economy and a corresponding correcting outflow. It was a system in which the Bank of England played a leading role, but where co-operation by Germany, France and the United States became increasingly important.

Bairoch (1974) divides the period into two: between about 1860 and 1880, there was a regression in the relative volume of trade between Europe and the Third World. Continental Europe was then in a relatively free trade phase, so the importance of intra-European trade rose. After 1880, there was a rise in the relative volume of exports to the Third World, especially to Africa. As a rule, the trade balance was more favourable for countries exporting agricultural products, so that trade with the Third World resulted in trade deficits for Europe. Green and Urquhart (1976) consider the relationship between population movement, savings and capital flows before 1914, concluding that (a) international movements of people and capital were not coterminous (b) in some countries, notably the United States and Germany and Italy after 1890, domestic savings were sufficient to support high rates of growth and (c) that there were countries (notably Argentina, Australia and Canada) which had large international borrowings, high immigration and high growth rates.

By contrast, the second period between 1914 and 1945 was so tumultuous as to defy consistent characterization. Convertibility was suspended by many countries during the Second World War. A new gold standard was established in a rather ragged fashion in the 1920s, only to be abandoned by many countries in equally ragged fashion in the 1930s. Henderson's (1955) division of the interwar period is standard: (a) a phase of inflation and foreign exchange confusion from 1919 to 1925 (b) a phase of expansion and large scale US lending in the later 1920s (c) the phase of world economic crisis from 1930 to 1933 and (d) a phase of partial recovery from 1933 to 1939.

Eichengreen (1992) has argued that the gold standard of the 1920s set the stage for the depression of the 1930s by heightening the fragility of the international financial system. Re-establishment of the gold standard after 1918 was made difficult by the different wartime inflationary experiences of countries and by disputes of war debts and reparations. Political and economic developments also compromised the autonomy of central bankers. The extent of deflation required by the operation of the gold standard from time to time and country to country was simply no longer tolerable,

especially in the face of large imbalances. The credibility and co-operation central to the operation of the gold standard declined. Eventually recovery was only possible once the gold standard had been abandoned.

Trade and capital flows were both strongly affected. Lewis estimated that, using an index of 100 in 1913 for the terms of trade of primary products, the index fell to 70.5 in 1921, rose again to 93.0 in 1927, fell to 65.1 in 1932 and rose to 81.4 in 1937.[45] After 1933, the volume of trade in primary products shrank relatively to manufacturing output because of measures taken by industrial countries to promote domestic revival without a corresponding increase of imports. These measures included selective import controls, protective import restrictions, preferential import restrictions, barter trade arrangements, commodity regulation schemes, international cartels and state trading.

The United Nations estimated that about $2 000 million annually of long-term and short-term capital moved on balance in the mid-1920s from capital exporters (principally the United States, the United Kingdom and France) to developed, semi-developed or underdeveloped debtor countries. After 1928 the flows slowed. First France reversed its capital outflow, then the United States capital issues for foreign account declined. Such capital flows as occurred increasingly took place within blocs of countries rather than through an open world market. International lending activities were curtailed also by the plight of many debtor countries whose terms of trade had deteriorated. Security of investment rather than yield became an increasing concern, especially in the light of increasing exchange controls and risk of default. There was no return to a steady capital flow between creditor to debtor countries between 1932 and 1939.

Under the gold standard, countries submitted their exchange rates to an international standard. In the late 1920s and 1930s, countries were subject to the beggar-my-neighbour devaluations and protectionism of other countries. By contrast, the Bretton Woods system was designed to protect the autonomy of national governments to determine their own national policies. Exchange rates had to be flexible, but not continuously floating. Changes in the exchange rate were to be discrete and infrequent. A consequence was the segmentation of national capital markets, so that international capital flows did not have to be considered continuously, as became necessary in the 1970s and beyond. In the event, although Bretton Woods did not require it, the post-war system became a fixed rate dollar standard up until 1971, when the United States was no longer willing to sustain the system and devalued.

In retrospect, the 1945-1970 period has come to be seen as something of a golden age in twentieth century economic history. One suggestion is that a major part of the rapid rate of growth came from the catch-up effects occasioned by the Second World War's destruction of physical capital in Europe and Japan.[46] A temporary depression in the relationship between human and physical capital can give rise to a temporary increase in the growth rate.[47] The economies of the United States and United Kingdom grew more slowly.

The devaluation of the dollar led to what McKinnon (1993) has called a 'floating dollar' standard from 1973 to 1984. If the currency of a country other than the United States weakened, the country usually reacted by contracting its domestic money supply, as happened in the Bretton Woods era. The United States itself conducted its monetary policy independently of the foreign exchanges. This led to considerable fluctuations in the world money supply and made exchange rates more variable, circumstances which the more co-ordinated macroeconomic policies of the late 1980s and early 1990s tried to alleviate. Greater capital mobility from 1980 made these problems more difficult. The transition from the Bretton Woods era meant that the attempt to explain exchange rates by trade patterns became obsolete. With the rise in capital flows that followed, asset based approaches have been more appropriate for some time.

Some of the developments since the 1970s have returned the world to a regime akin to that of the late nineteenth century, albeit with much more sophisticated financial markets and settlements

[45] See Lewis (1952).
[46] See for instance Olson (1982).
[47] See Barro and Sala-i-Martin (1995): 172-179.

often at the speed of light, and without the nominal anchor of the gold standard, which kept prices stable. More than half a century of tariff reduction negotiations under the General Agreement on Trade and Tariffs and the World Trade Organisation have not entirely undone the protectionism of the interwar period or bouts of it thereafter.

The survey of modern growth theory and the account of the capital flow and trade regimes since the middle of the nineteenth century have identified the issues for discussion in the South African record. It is now time to consider that record itself, employing mainly narration and simple tabulation for the earlier periods and econometric techniques for more recent decades.

This section delineates the main features of economic growth during the four sub-periods identified in Section II, i.e 1870-1914, 1914-1945, 1945-1970 and 1970-2000.

Pre-1945 statistical information is sparse. A full set of national accounts, for instance, dates only from 1946. General assessments of the determinants of growth in the first two periods are provided in this section. The narrative treatment of the second two sub-periods in this section is brief, since Section IV provides a detailed econometric treatment of the period after 1945.

4 South African growth before 1914: diamonds, gold and agricultural exports

4.1 *Diamonds*

Alluvial diamond mining commenced along the Orange and Vaal rivers in 1867; the real action started in Kimberley three years later. Britain was prompt to annex the town as part of Griqualand in 1871 and it was incorporated into the Cape Colony in 1880, pre-empting the sort of political conflict which was to arise later over gold. The foreign capital requirements for diamond mining were modest. Only small amounts of capital were applied to the alluvial diggings and to the Kimberley diggings before 1885. Profits were so large among the successful that most capital requirements could be financed directly from them. In 1938, Frankel estimated than probably no more than £ 20 million of foreign capital had been invested in the diamond industry.[48]

The early 1880s saw a struggle for dominance between diamond producers and by 1885 De Beers was pre-eminent, Rhodes obtaining complete control over the company two years later. The emergence of De Beers as pre-eminent solved two problems: firstly, it concentrated capital to an extent sufficient to finance deeper level mining in Kimberley and secondly, its monopoly status enabled it to control supply and hence avoid over-production, a role it was to play for over a century. The control of production suited not only De Beer's interests; it also ensured a steady flow of revenues to the Cape Colonial government. Directly and through improving credit, the flow of revenues permitted the rapid expansion of infrastructure. Between 1875 and 1895, the extent of Cape railways increased from 150 to 2 253 miles.[49]

Apart from expansion of state capacity, the spin-offs of diamond mining were twofold. First, it induced a range of activities from agriculture to small manufacturing to services designed to meet Kimberley's needs. Second, it created accumulations of capital useful in the development of gold mining.

4.2 *Gold*

Developing the diamond mining industry was child's play compared with the challenges facing the gold mining industry after the discovery of gold on the Witwatersrand in 1886. Very soon, the problem of financing deep level mining emerged and was resolved by the group system. Most individual mines belonged to groups which raised and channeled finance; certain kinds of technical

[48] See Frankel (1938:53).

[49] For an extended discussion of infrastructure development in South Africa, see Perkins (2003).

expertise were also attached to groups and were available to work on the problems of individual mines. Financing the gold mines was not straightforward. Frankel estimated that about 60% of the £ 200 million invested in the Witwatersrand mine was foreign. But the number of foreign investors prepared to stick with mining investment in South Africa was small, the willingness to invest was strongest when interest rates in Europe were low, and the investment was risky, with a low average yield of 4.1% between 1887 and 1932.[50]

In addition to individual mines and mining groups, the Chamber of Mines was formed to attend the interests of the mining industry as a whole. Through it was formed the Witwatersrand Native Labour Association in 1896 to manage the supply of African labour, a second major problem for the gold mines. The first agreement with the Portuguese authorities in Mozambique about the recruitment of mine labour was negotiated the following year. Closely related was the issue of working costs, partly because the mines were producing the commodity at the heart of the international monetary system and whose price was fixed in sterling terms, and partly because the body of exploitable ore varied inversely with working costs. The labour and the working cost issues were far from being fully resolved by 1910. This affected the extent of the ore which it was profitable to mine. In 1898 the average ore grade being mined was nine pennyweight per ton; forty years later, the mines were able to mine ore of half that quality.

The most intractable difficulty the mines faced within the first fifteen years was the relationship with the government of the South African Republic. A great deal has been written about the rising tensions which led to the South African War of 1899-1902. But a single episode shows clearly the clash of interest between the mines and the state. In 1897, Kruger's Executive Council, in an attempt to resolve differences with the mining industry, set up an industrial commission of enquiry into the industry. The industry was represented on the commission. When it reported in July 1897, it reflected the concerns of the industry comprehensively. It identified state concessions (granting of monopolies, in particular for the production of dynamite), railway rates, duties on foodstuffs and poor enforcement of laws affecting mining all as putting up costs in the mining industry.[51] Concessions, high railway tariffs and duties were all economically inefficient ways of extracting resources from the mines. This meant that the social costs exceeded the revenue raised, and the revenue itself landed up in the pockets of concessionaires as much as in the state treasury. Some adjustments were made as a result of the report, with new duties imposed to finance them, but they failed to accommodate the industry in any serious fashion. When Smuts and Leyds re-opened negotiations with industry leaders in 1899, the situation had become too polarized to allow of any success.

The Transvaal colonial administration governed in a way more consonant with growth than the South African Republic had done. For instance, the report of the 1904 Transvaal Census showed that there were twice as many children in school in that year than there had been in 1898. The records of all four colonial administrations indicated an increasing propensity to work together, paving the way for Union in 1910.

4.3 *Agriculture*

South Africa was an exporter of agricultural goods before it exported anything else and by 1910 it was exporting nearly £ 10 million of agricultural goods made up as follows:

[50] See Frankel (1938: Section II).
[51] See Smith (1996:116).

Thousands of pounds	
Wool	3831
Hides and skins	1282
Wattle bark and extract	219
Fruit	35
Other	4159
Total	**9526**

4.4 *Assessment*

In 1912, South Africa could be characterized as an open economy. Total exports of South African produce amounted to £ 23.2 million, excluding ships' stores and gold. Gold exports were £ 38.3 million. National income in that year was £ 132.9 million. This level of national income had been reached by substantial capital imports, both directly in the gold mining industry and indirectly through loans to colonial governments as their revenues expanded. The export of gold and diamonds could have taken place under any international monetary and trade regime, but agricultural exports were facilitated by low levels of protection elsewhere. Manufacturing was a tiny proportion of national income (less than 7%) and an even smaller proportion of exports.

One problem facing the Union was the inheritance of a high level of public debt, standing at £116.0 million in 1910 and representing 96% of national income in 1912.[52] Of the inherited debt, £ 74.1 million had been incurred on railways and harbours and a further £ 17.1 million had its origins in war, defence and post-1902 reconstruction in the Transvaal and Orange Free State.

Another was the low level of education. Evidence from the 1960 Population Census indicates that white people born in 1885 achieved, on average, eight years of education. Everyone else born in that year achieved an average of less than two.

On the other hand, the level of development of financial institutions was substantial. There were five banks trading in the Union in 1910, as well as a Post Office Saving Bank. The Land Bank was created by statute in 1912 and started operating the next year. The Cape alone had 34 life assurance companies.[53]

The features of the international economic regime which assisted South African growth between 1870 and 1914 were the free flows of direct and portfolio capital and the free trade regime. South Africa did well to attract the volume of mining finance that it did and pushed infrastructural development to the limit, creating a somewhat precarious fiscal inheritance at Union.

5 South African growth between 1914 and 1945: exogenous shocks and the rise of manufacturing

5.1 *The growth record*

Frankel identified three periods of growth between 1911/12 and 1938/39.[54] They were:

Period I 1911/12-1919/20
Period II 1922/23-1928/29
Period III 1932/33-1938/39

Period I saw an increase of £ 48.2 million in national income, period II an increase of £69.4 million and period III an increase of £155.2 million, all in 1929 prices. The last period of growth was

[52] Union Year Book 1910-1916: 636
[53] Union Year Book: 1910-1916: 644-649
[54] See Frankel (1944: Introduction).

by far the strongest, and the first period the weakest. Periods II and III can be clearly identified in Figure 1, which shows that Period III stretched on into the War.

The extent of growth in the first period is very uncertain. The difficulty lies in (a) the lack of information about nominal national income in the period between 1912 and 1918 and (b) the lack of a reliable GDP deflator and the consequent need to use the retail price index instead in a period when prices were increasing rapidly.

In his study of the business cycle, Schumann found that there was mild economic prosperity between 1910 and the middle of 1913, followed by uncertainty and recession until early 1915 and then an upswing until mid-1920.[55] However, Schumann's indicators were a mixture of real and nominal variables, so his study does not overcome the difficulty of distinguishing real from nominal effects in this period.

By contrast, it is clear that there was substantial growth in Periods II and III. The period as a whole is one of punctuated growth. The punctuations originated in adverse external shocks to the economy.

5.1.1 *The adverse shocks*

The first adverse shock was a massive increase in the wholesale price index of imported goods, which started in 1915 and peaked in 1920. There was a later, and smaller, increase in the wholesale price index of South African goods.[56] The prices of South African tradeables would have responded to war-time and immediate post-war inflation in trading partners. There would have been little reason for the price of non-tradeables to rise. Accompanying this price shock was a rapid increase in the quantity of money in circulation: from £25.7 million in 1914 to £65.8 million in 1919.

Inflation was followed by deflation. South Africa, like Britain, remained on the gold standard until 1918. After that, the sterling price of gold rose from £4.25 per ounce in 1918 to £5.59 in 1920, but then dropped to £4.61 in 1922.

In 1922, Britain announced its intention to return to the gold standard at the pre-war parity. This it did in 1925. This was the second adverse shock. The logic of the decision is that prices and nominal wages (except in so far as there had been productivity gains) would return to pre-war levels. What made the gold standard everywhere less suitable for the period after 1918 compared with the late nineteenth century, was the shift in social power towards workers, resulting in greater downward stickiness of nominal wages. The deflations required by the use of the gold standard were harder to impose.

In South Africa, the second adverse shock cast its shadow before it. The sector most sharply affected was mining. Working costs, both in the form of material inputs and wages had risen from 1915. The payment for a machine stopping contract shift in the gold mines on the Witwatersrand rose from 29s 10d in 1916 to 49s 10d in 1921. In other parts of the mining sector, there was a similar rise, though not so steep. With the prospect of a drop in the sterling price of gold, the wage level was not sustainable. The mines proposed a rise in the proportion of 'non-white' labour (paid at much lower rates). The white workers resisted, rebelled and were defeated in early 1922. Payment for a machine stoping contract shift fell to 30s 4d in 1922. Mining wages remained low until the late 1920s, in contrast with the pattern in manufacturing and on the railways and harbours.

The third adverse shock was the fall in commodity prices from 1929. This hit non-gold exports which fell from £ 44.2 million to £ 17.9 million between 1929 and 1932. Recovery of non-gold exports was relatively slow and they did not reach 1928 levels again until the closing years of the second world war. Agriculture, particularly, and parts of manufacturing were affected by the drop in foreign demand. Gold exports came to the rescue, growing from £ 25.8 million in 1928 to £ 47.6 million in 1932, largely softening the shock from other commodity prices to the balance of payments. In terms of production, the agricultural and commercial sectors were hardest hit.

[55] See Schumann (1934).

[56] In the 1914-1945 section, except where otherwise stated, statistics are taken from Union Statistics for Fifty Years.

5.1.2 *Departure from the gold standard*

South Africa left the gold standard at the end of 1932 and the effect on the economy was immediate. The sterling price of gold moved up from £ 4.31 in 1932 to £ 7.10 in 1935. It was stabilised at £ 8.40 between 1940 and 1945. Gold output fluctuated between 1932 and 1937 and rose from 11.7 to 14.4 million ounces between 1937 and 1943, falling back to 12.2 million ounces in 1945. The gold price shock was all the more effective for occurring in a deflationary world economic environment and with substantial unemployment at home. Both these factors meant that the stimulus fed through to real variables rather than to price levels, at least until the second world war started.

5.2 *Manufacturing*

In 1911, half of manufacturing industry consisted of the processing of food, drink and tobacco. The rest consisted mainly of building materials, construction, printing, wagons and carts, explosive for the mines, foundries and small engineering for the mines and railways, matches, soap and candles, leather, some electricity and gas, clothing and footwear.[57] Between 1912 and 1939, value added in private manufacturing rose from £ 8.9 million to £ 53.8 million. The increase in output was accompanied by considerable diversification: motor vehicle assembly (1922), textiles and cotton spinning, diamond cutting and the manufacture of rubber tyres and the metal trade. The Iron and Steel Corporation (ISCOR) commenced production in 1933.

How much of this progress should be attributed to state intervention? Intervention had more than one form. There was the conventional dimension of import tariffs, imposed in accordance with the principles laid down by the Cullinan Commission on Trade and Industries of 1910-11. These were (a) that a fair proportion of the raw material used is or can be obtained in South Africa (b) that a fair proportion of White labour is employed and (c) that there is a reasonable chance of the industry being established.[58] Import tariffs were overhauled in 1925, and in 1939 import duties amounted to 14.25% of the value of imports.[59] A degree of protection for inland industries could be obtained by manipulating railway tariffs. South Africa had a degree of natural protection simply by virtue of its distance from other industrial countries. This natural protection was considerably enhanced during both world wars, leading to an acceleration of import substitution in those years. In line with Cullinan objective (b), White employment as a proportion of total employment remained roughly constant (and high) between 1918-19 and 1938-39 (38% and 39% respectively), compared with 12% and 13% in mining.

There was also direct state intervention through legislation in 1928 to establish ISCOR and through the establishment of the Industrial Development Corporation, which was designed to help capitalise South African businesses, many of whom found it hard to raise capital by themselves. Capital intensification, to judge by the available indices, proceeded fairly slowly. In 1915-16, there were £ 180 of land, buildings and machinery and 1.13 horse-power of motive power for every worker in manufacturing. By 1938-39, these ratios had risen only to £ 216 and 1.68 horse-power. Dependence on imported raw materials remained high: 51.0% of raw materials for manufacturing were imported in 1916-17 and 48.3% in 1938-39.[60] Frankel estimated in 1944 that for every £ 100 of goods imported by manufacturing industry, exclusive of imports and machinery, only £ 7.6 was exported by it.[61] Manufacturing, therefore, critically depended on exports from other sectors, notably mining.

[57] See Pearsall (1937:412).
[58] See Pearsall (1937:413-14).
[59] See Board of Trade and Industries (1945: Paragraph 450).
[60] See Busschau (1945:223).
[61] See Frankel (1944:115).

5.3 *Gold*

Gold output was determined by a complex set of factors: the exhaustion of old mines, the development of new ones, the markedly slower rate of investment in them between 1914 and 1932 compared with the pre-1914 period (after 1932 the investment rate rose sharply in response to a higher gold price), developments on the labour front, fluctuations in the gold price and the level of working costs. Between 1910 and 1922, gold sales fluctuated between 7.0 and 9.3 thousand ounces. Thereafter, sales generally increased from 9.1 thousand ounces in 1923 to 14.4 thousand ounces in 1941, falling back to 12.2 thousand ounces in 1945.

Milestones in relation to mine labour were threefold. The outcome of the 1922 strike settled the question of the ratio of White to African workers substantially on the industry's terms. The agreement with Mozambique was renegotiated in 1928. Most importantly, permission to recruit 'tropicals' – labour from north of 22 degrees south – was given provisionally year by year from 1933 and was then embodied in the Immigration Amendment Act of 1937. The increasing reliance on foreign labour was what made possible the stabilisation in real terms of African wages between 1911 and 1969[62].

5.4 *Agriculture*

The physical volume of field and livestock products from commercial farms rose fairly steadily from 1910 to 1945. Using an index set at 100 for 1937, production in 1912 was at 46, rising to 57 in 1920, 90 in 1930 and 104 in 1945. The problem facing agriculture was taken to be unstable prices. Hobart Houghton pointed out that the price of wool (internationally set) varied from 32.9d per pound in 1920 to 10.7d in 1921, 21.6d in 1925 and 4.5d in 1932.[63]

However, value added in agriculture ranged from an index of 46 in 1912 to 101 in 1920, 70 in 1930 and 162 in 1945, again with 1937 set as 100. Dividing the nominal value index by the physical volume index gives a rough agricultural price index which varied from 90 in 1912 to 177 in 1920, 77 in 1930 and 151 in 1945. This was not so far from the wholesale price index for all goods which varied from 86 in 1912, 214 in 1920, 98 in 1930 and 153 in 1945, the main deviation being in the 1929-32 depression.

The state's response to problems in agriculture was to intervene extensively. Frankel observed in 1938 that there had grown up a system of tariffs, subsidies, quotas, price regulating and marketing schemes which was remarkable in its wide ramifications, contradictions and complexities. He estimated that the state had spent over £ 71 million from loan funds and £ 41 million from revenue funds on agriculture between 1910 and March 1936.[64] Richards estimated the social cost of the divergence between agricultural costs of production and prices amounted to £ 7.5 million in 1933,[65] a year in which agriculture's contribution to national income was £ 30.6 million. Neither Frankel nor Richards thought value for money had been obtained. Frankel pointed out that agriculture was more dependent on the rest of the economy in 1938 than ever before. Richards, while noting that developments in South Africa were similar to those elsewhere, pointed to the inefficiencies of resource allocation occasioned by the system and the impossible burden of co-ordination by the state.

5.5 *The labour market and the creation of human capital*

5.5.1 *Labour absorption*

For the period 1914-45, yearly employment statistics were collected only for mining, private industry (which included electricity, gas and steam and construction), and South African Railways and Har-

[62] See Wilson (1972).
[63] See Hobart Houghton (1971:24-25).
[64] See Frankel (1938:119-122).
[65] See Richards (1935:384).

bours. Some of the agricultural censuses (1918, 1925, 1930, 1937 and 1945) collected employment data, but not always for the same month of the year, making comparison more difficult. Data on employment for all sectors were made in the 1921, 1936 and 1946 censuses, though data for Africans were collected only in 1946.

Labour absorption rates can be calculated for Whites, Coloureds and Asians in 1921 and 1946, on the assumption that 'activities not described and unemployment' should not be counted as employment. In 1921, 52.3% of Whites over the age of fifteen were employed; in 1946, it was 51.4%. The corresponding estimates for Coloureds were 61.7% and 57.0% and for Asians, 62.9% and 44.1%. The estimates for the three groups as a whole were 55.2% in 1921 and 52.2% in 1946. The small drop in labour absorption means that the economy absorbed nearly all the increase in the relevant labour force.

Less complete estimates can be obtained for Africans. Employment in mining, private manufacturing, electricity, gas and steam and on South African Railways and Harbours grew from 334 948[66] in 1921 to 693 782 in 1946, or from an index of 100 in 1921 to 207 in 1946. The African population size index grew from 100 in 1921 to 166 in 1946, so absorption in these sectors outstripped the rate of population growth. Absorption in agriculture probably proceeded at a lower rate, but it is impossible to hazard a guess as to what happened in the remaining sectors of the economy: trade, other parts of transport, storage and communication and services.

The rapid growth in African employment in the 1930s in mining and manufacturing had the consequence of putting pressure on the supply of African labour to farms, and in 1937 a committee reporting to the Minister of Native Affairs was appointed to investigate the situation. The committee found that there was indeed a shortage and suggested a set of measures designed to improve the efficiency of farm labour. However, the estimation of the size of the African labour force by the committee was too low. They put it at 1 632 000, whereas application of the labour force participation rate in the 1951 census to the 1938 population yields an estimate of 2 487 000, just over two million of which would have been male. The latter estimate may, in turn, be too high, since labour force participation generally rises with the level of development. Moreover, labour force participation may indicate participation over part of the year, whereas employment estimates are often expressed as person-years worked over the year. It seems reasonable to conclude that, against such practices as seasonal work, labour-tenancy and spells of rest between contracts in the urban areas, the African labour market tightened by the late 1930s and during the war.

5.5.2 *Regulation of the labour market*[67]

Throughout the period, the labour market was regulated on a segregated basis. The system for African labour was administered under the Native Labour Regulation Act of 1911 and the Natives (Urban Areas) Act of 1923, against the background of the entire system of segregationist legislation. The 1911 Act provided for the proclamation of labour districts in areas where large number of Africans were employed in mining, industrial or other work. In such areas, stricter pass regulations were applied and managers were employed to supervise concentrations of African workers of fifty or more. The system was based on that in operation in the Transvaal before 1910 and mostly applied to that province. Fourteen labour districts in the Transvaal were initially proclaimed; by 1945, there were eighteen labour districts in the Transvaal, three in the Orange Free State, two in Natal and four in the Cape. None of the major urban areas outside the Transvaal were labour districts. There was modest growth in African employment in the labour districts in the 1920s and much more rapid growth in the 1930s. The mines, of course, had their own system.

Regulation of conditions under which Whites worked was more complex. Official anxiety about the position of unskilled White workers was present throughout the period. Labour bureaus, modelled on those in the old Cape Colony, were opened for Whites to help them find employment in

[66] The estimate for private industry is interpolated.

[67] Statistics in this section are taken from editions of the Union Year Book between 1916 and 1945.

the major urban centres shortly after Union. By the early 1920s, concern was not simply over employment, but also over wages.

Anxieties were heightened when the economy performed poorly, as it did between 1920 and 1922. The government instituted temporary relief works on government undertakings in late 1920 and employment on these peaked at 7 920 in August 1922, dropping to 4 284 in May 1923. It rose again to 10 868 in September 1924, declining to 3 608 in December 1926. After that the number rose once more, reaching 8 213 in December 1930. The relief works were categorised into subsidized works, where funds voted by Parliament made up the difference in cost between White and African labour and non-subsidized works, where the additional cost was absorbed by the employing agency itself. Initially the railways and forestry projects took responsibility for the additional costs. Municipalities also offered subsidized relief from 1924.

The civilized labour policy, announced in a Prime Minister's circular in October 1924, had as its goal the substitution, wherever practicable, of White ('civilized') labour for African ('uncivilized') labour in departments of state. This effectively augmented, and rendered permanent, non-subsidized relief work and rendered it less visible over time, though statistics of both groups were kept separately until the early 1940s. By March 1926, 1 361 substitutions of Whites for Africans had taken place.

Official awareness of the poor white problem also led to various schemes attempting to assist them to farm. A work colonies system was created to which adults unwilling to work could be committed. None of these schemes were extensive or effective.

The experience of the 1920s produced principles and the institutions for use in the depression starting in 1929. A particular effort was started in the summer of 1932-33, whereby the Department of Labour greatly increased expenditure of unemployment relief and subsidies to employers. Subsidized employment on relief works peaked in mid-1933 at over 25 000 jobs. By July 1936, it dropped to just over 10 000 and five years later it was little over a thousand. The number of adult White males registered for unemployment followed the same patters: 9 917 in January 1932, a peak of 14 678 in July 1933 and 5 754 in July 1936.

Non-subsidized employment was 23 489 in January 1932 and grew for the rest of the decade to 30 880 in 1940; this component can be regarded as the continued workings of the civilized labour policy. These numbers can be compared with the economically active White population of 740 544 as measured by the 1936 Census. Coloured workers also benefited from employment on relief works, both subsidized and unsubsidized. 4 305 were employed on them in January 1933 and 11 901 in 1940.

Taken as a whole, labour market regulation had the distributive effect of reallocating unskilled wage labour from Africans to Whites. The impact of substitution on efficiency of redistribution can be divided into two parts: (a) the difference in productivity between the worker installed and the worker displaced, which would have been small and (b) the difference in wage, which in all cases was borne by the state (and therefore by the tax payer), either directly in higher costs of state administration, or indirectly in the form of a wage subsidy to a private employer. The impact of high wages for part of the population on economic growth was likely to have been limited. Except in the case of transport, it did not have much impact on input prices. It did raise the cost of non-tradeable government services and so mainly represented a transfer from taxpayers to white workers.

Although pass laws existed, the regulation of the movement of African labour was neither comprehensive nor strict enough before 1945 to impede movement to where jobs could be found, mainly in the urban areas.

5.5.3 *Human capital*

The history of the 20th century has been a history of erosion of the educational attainment gap between whites and all other population groups. People born in 1915 had the following average educational attainments: Africans two years, Coloureds four years, Asian men five years, Asian women two years and Whites ten years.

Political changes and economic circumstances have had no detectable influence on this process as it affects the number of years of education provided. Political and economic conditions have had an influence on the relative quality of education provided.

In 1921, 591 468 pupils were in school. By 1945, the total had risen to 1 282 908, representing an average annual increase of 3.3% per year, well ahead of population growth. The Coloured and Asian share rose from 10.2% in 1921 to 17.0% in 1945 and the African share from 32.8% to 48.4%. Over the same period, the number of university students rose from 3 389 to 14 504 and between 1927 and 1945 the number of technical college students rose from 15 278 to 42 132.

The quality of education in a segregated system varied. In the 1930s, Malherbe concluded that, as a rule of thumb, one could regard the cognitive competences conferred by a given African school grade as equivalent to those achieved by two grades lower in a White school.[68]

5.6 *Fiscal and monetary policy*

The ratio of public debt remained high in relation to net national income from 1910 to 1932, when it peaked at 132% of net national income. It was the increase in the gold price from 1933 which enabled the government to achieve the lower ratio of 73% in 1939. It rose again during the war to 88% in 1945.

Union expenditure exceeded union revenue by substantial amounts between 1912 and 1923. However, revenue was boosted by the introduction of personal income tax from 1915 and expenditure was reined in after 1923 and the deficits were turned into surpluses in all years from 1924 to 1945 except 1931.

M1 (notes and coins in circulation plus demand deposits) stood at above 30% of net national income in 1918 and 1919. Between 1920 and 1927 the ratio dropped to between 21% and 27% and between 1928 and 1932 it dropped below 20%. For the rest of the 1930s it fluctuated between 27% and 34%. It rose during the war years to 57% by 1945.

In 1935, there were 75 building societies in South Africa, 46 permanent and 29 terminating. In 1943, there were 108 insurance companies, 30 of which had headquarters in South Africa.

5.7 *Assessment*

The period divides into two: from 1914 to 1932, when the South African economy was buffeted by adverse shocks coming from the international economic system, and from 1933 to 1945, when the rise in the gold price and the heightened effective protectionism occasioned by the Second World War permitted a sustained, rapid rate of growth. Most of the economic progress between 1914 and 1932 was made between 1922 and 1928.

State intervention became pervasive in agriculture, manufacturing and the labour market. It was often wasteful, but it was not ruinous in terms of economic growth. Absorption of new entrants into the labour market was high for the period between 1921 and 1946. Progress was made with the development of human capital. And, after 1933, the state's finances were put on to a much sounder basis.

The whole economic system grew up in the context of racial segregation, a system which was bound to be undermined by increasing urbanization. Some contestation of the political system itself had occurred by 1945. The next period in South Africa's development was to see much more.

[68] Malherbe (1977).

6 The South African economy from 1945 to 1970: the Bretton Woods years

The statistical record of growth improves dramatically after the introduction of the national accounts in 1946. Table 1 compares the industrial structure of the economy in 1946 with that in 1970.

Real gross value added more than tripled in twenty-four years. The most spectacular growth was in manufacturing whose share in gross value added nearly doubled between 1946 and 1970. By contrast, the share of general government services dropped substantially over the period. There was further diversification away from agriculture and mining, though this was the period of the development of the Free State gold mines.

Implicit in the Bretton Woods system was the importance of a balance of payments constraint. The automatic adjustments of the gold standard were replaced by two mechanisms for dealing with a deficit on the balance of payments: changes in fiscal and monetary policy, in the first instance, and adjustment of the exchange rate in the second. Hobart Houghton identifies four occasions when such adjustments were necessary. The first was in 1948/49 when there was a rapid increase in imports of both consumer and capital goods. This was resolved when the United Kingdom devalued sterling in 1949 and South Africa immediately followed suit. The appearance of balance of payments deficits in 1954 and 1958 were dealt with by fiscal and monetary policy adjustments.

The fourth and most serious crisis was in 1960/61 after Sharpeville and the consequent political unrest. Here the deficit arose on the capital rather than the trade account and it was met by the imposition of controls over capital movements and an end to free convertibility of the rand.[69] Capital controls were not uncommon in the Bretton Woods era and the political repression which accompanied them restored stability to the point that it could underpin the rapid growth of the 1960s. But both the political and economic measures taken had long term costs. The proscription of the African National Congress and the Pan Africanist Congress drove them into exile and created an increasingly potent form of off-shore pressure on the apartheid state. The imposition of capital controls created inefficiencies, which would be increasingly felt in the post-Bretton Woods era. Capital controls and a dual exchange rate also created incentives for capital flight, especially at times of instability, which had reached substantial proportions by the end of apartheid.

Political repression made it possible to implement more fully two items of social engineering which apartheid had embraced in the 1950s. The first was Bantu education which effectively closed down private schooling for Africans and which was funded by an ungenerous and inelastic formula from 1954: £ 6.5 million annually plus 80% of the poll tax on Africans. This did not stop increasing enrolments, but it did lead to declining real per capita expenditure on African pupils. By the late 1960s, the contribution from the poll tax had increased to 100%, 'loans' had been granted for African education and finally the special Verwoerdian funding arrangements for African education were terminated in favour of the standard process of budgetary allocation. But the damage was done. Educational expenditure had become more inefficient than before and Africans deeply resented it. Average educational attainment among people born in 1940 was: Africans four years, Coloureds six years, Asians eight years and Whites eleven years.

The second item was the attempt to distribute the population in line with the aims of territorial apartheid. That this was ultimately impossible should not blind one to the large effects actually achieved. There had been a not very coherent system of pass laws and influx control in the years of segregation (eroded by the rapid growth from 1933), but it had not any discernible effect on African urbanization up until the early 1950s. Influx control was then strengthened, and for a period of about twenty years from 1955, it slowed African urbanization substantially. There was a parallel programme for the rural areas which took two main forms – the removal of people in 'black spots', i.e. African-owned land now regarded by the state as inappropriately located in relation to Bantustans, and the removal of 'surplus labour' from white commercial farms. Along with removals of Coloured

[69] Hobart Houghton (1971:39).

and Asian people in terms of the Group Areas Act in cities, these measures affected millions of people, and their effect on Africans was usually to move them further away from jobs. In 1950, there were eleven Africans in reserves for every ten on commercial farms. By 1996, there seventy-five Africans in tribal rural areas for every ten on commercial farms. Achieving these objectives necessarily entailed a massive assault on black property rights – and increased substantially the search costs that future generations of workers faced for entry into the formal labour market.

Between 1945 and 1970, government revenue consistently exceeded government expenditure. In 1946, government debt stood at 89.7% of net national income. By 1970, the debt to GNP ratio had dropped to 39.7%. In 1946, there were eight commercial banks in South Africa. In 1959, the number of building societies had dropped to 28. In general, controls on capital movement and growing international isolation reduced the number of private sector financial institutions through mergers and acquisitions on the one hand and foreign withdrawal on the other.

Using growth accounting techniques, it is possible to identify the main drivers of growth in manufacturing by sector between 1920 and 1969.

There are two distinct sub-periods (1920-1945 and 1945-1969), which differ both in the rate of growth, and in the primary drivers of growth. In particular:

1. On the whole, growth between 1945 and 1969 was higher than between 1920 and 1945, though the 1934-39 period saw some very high growth rates. (After 1970, manufacturing growth fell to the lowest recorded levels in the twentieth century.)

2. The period 1920-1945 is characterized both by a relatively diverse set of growth drivers *across* industries, as well as *within* industries in different sub-periods. Some industries relied on capital accumulation, some on increasing employment, and some on Total Factor Productivity (TFP) efficiency gains for their growth. Equally, some industries relied on capital accumulation in some sub-periods, and on efficiency gains in others.

3. The period 1945-1969 is characterized by growth that is predominantly led by capital accumulation.[70]

The main sources of manufacturing growth between 1920 and 1945 are reported in Table 2. Those between 1945 and 1969 are reported in Table 3.

7 The South African economy since 1970: the turbulent years

Apartheid was at its zenith in 1970, but the economy was soon to be affected by a number of factors, both international and domestic. The suspension of dollar convertibility in 1971 ushered in a period of uncertainty about the conduct of macroeconomic policy. The first oil price hike in 1973 affected South Africa adversely as a net importer of oil. The Durban strikes of the same year signaled the re-emergence of African trade unionism, dormant since Sharpeville. Six years later the government was to recognize African trade unions as part of the officially sanctioned industrial relations system. More serious than all these factors was the Soweto unrest of 1976, sparked by a dispute over language of instruction. The lengthy and substantial confrontation was to set a precedent for political struggle over the next eighteen years, and it had an immediate effect on confidence in the economy. The second oil price hike struck the economy in 1979.

Despite these shocks, the economy grew at an average annual rate of close to 4% throughout the 1970s – faster in the first half of the decade than in the second. The beginning of the 1980s saw the economy benefit from the gold price spike and in 1981, real per capita income achieved its highest

[70] Of course, the above is a broad-brush characterization of the evidence, and by its very nature hides substantial nuance. For details, readers are referred to Fedderke and Schirmer (2004).

level ever. From then until 1994, the trend was downwards with real per capita income in 1994 18% lower than it had been thirteen years earlier. The immediate reason for downward movement was the return of the gold price to lower levels. But the longer term reason was political instability.

The adoption of the tricameral constitution in 1983 and its rejection by African National Congress aligned political groupings led to the formation of the United Democratic Front in 1984. This was followed by the emergence of the limits of the willingness of the P W Botha administration to negotiate in 1985, the imposition of financial sanctions, the uncertain and turbulent period until the de Klerk administration removed political proscriptions in 1990, and the period of political negotiation leading to the first universal franchise election in 1994.

Gross value added at basic prices increased by 73% between 1970 and 1994. Noteworthy is the slight absolute decline and the large relative decline in mining over the period. The sectors showing the greatest advance in relative terms were finance, insurance, business services and real estate, and government.

Average educational attainment among people born in 1970 was: Africans eight years, Coloureds nine years, Asians and Whites close to twelve years.

The excess of government revenue over government expenditure remained positive until the mid-1980s. Thereafter it turned negative and sharply so by 1993, contemporaneously with growing political crisis. The position has improved since the adoption of the Growth, Employment and Redistribution programme in 1996, a core aim of which was reduction in the budget deficit. The ratio of government debt to GNP rose from 34.9% in 1985 to 51.4% in 1995, falling back thereafter.

Inflation rose from low levels during the early 1970s and fluctuated around a level of approximately 15% from 1975 until the early 1990s. In the later 1990s it dropped to half that level.

8 Growth in the post-war period: the econometric evidence and its interpretation

8.1 *The contributors to growth*[71]

The crucial initial question is whether growth in South Africa has been primarily driven by accumulation in factor inputs, or whether growth has been led by efficiency gains as measured by growth in total factor productivity (TFP). Where it is the former, the explanatory task ahead is to account for the drivers of investment in physical capital, and for the characteristics of the labour market. Where TFP growth is dominant, it is technological progress and its determinants which are most important.

International evidence from developed countries has often pointed to the significant contribution of growth in total factor productivity rather than growth in factor inputs to output growth.[72] In effect, growth in output in developed countries is difficult to explain by reference to growth in factor inputs, and instead most economic growth is the result of technological advance.

International evidence shows that developing countries are different.[73] They often show a changing pattern of growth, beginning with a heavy reliance on capital growth, but shifting to total factor productivity growth with rising per capita GDP.

In what follows we briefly consider evidence on the structure of the South African growth experience over the 1970-97 period, employing standard growth accounting decompositions.[74]

[71] The discussion of this subsection draws substantially on evidence presented in Fedderke (2002a). Readers are referred to this source for more detailed sectoral and temporal TFP decompositions, as well as real cost reduction computations.

[72] See for instance Abramovitz (1956, 1986, 1993). For continued and more recent discussion of this evidence see also Fagerberg (1994) and Maddison (1987).

[73] See for instance Lim (1994).

[74] Computation of Total Factor Productivity (TFP) growth is by means of the standard primal estimate, computed as the difference between real output growth and the growth rates in physical capital stock and the labour force,

South Africa's aggregate experience mirrors that of many developing countries. Figure 2 shows that the contribution of growth in total factor productivity to South African growth in aggregate output has been steadily rising since the 1970's. As was the case in the preceding decades, the 1970's and 1980's saw growth that was heavily led by growth in capital and labour inputs, with very little contribution by technology. In the 1990's the situation is reversed. In the 1990's growth in the labour force input contributed negatively, and growth in the capital input contributed relatively weakly to growth in GDP. Instead, the single strongest contributor to output growth during the course of the 1990's is a strong augmentation in technology.

Part of the reason for the change in the 1990's was a decline in formal sector employment,[75] so that growth in labour inputs could not possibly have added to the growth in real output of the economy. The declining contribution of capital to the growth performance of the South African economy is due to the declining investment rate that South Africa has experienced.[76] We are thus left with a finding that the contribution of technological progress to South African growth in aggregate has been rising since the 1970's - though admittedly it has contributed a rising share to a declining growth rate in output.

The aggregate evidence does hide strong sectoral differences.[77] The only consistent feature across all four principal sectors of the South African economy is that the contribution of labour toward output growth has been on a downward trend from the 1970's through to the 1990's. In terms of the contribution of growth in capital stock, we find that in the agricultural sectors, the mining industry and the service industries capital has been of declining importance as a contributor toward output growth, while for manufacturing industry it has assumed increasing importance. Finally, in terms of the contribution of technological progress, the strongest efficiency improvement has been evident in agriculture, though the contribution declined during the 1990's. Mining by contrast, while coming off a low rate of technological progress, has been on an upward trend, as has services. Manufacturing has shown the weakest performance in terms of technological progress in the South African economy - at least during the course of the 1990's.[78]

The implication of the above evidence confirms our initial finding: that technology as a contributor to economic growth in the South African economy has become increasingly important, though sectoral differences cannot be neglected. In particular, the exception to this finding is that in the manufacturing sector specifically the 1990's have seen a process of restructuring, with a strong link between growth in capital stock and output growth, and a declining importance of technological innovation.

These findings lead on to further questions.

The changing *structure* of South African output growth deserves close attention. Why in particular has the growth in capital stock contributed in declining measure to the growth in output? What is it about the labour market that has led to the decline in employment creation, and hence to a virtual absence of labour as a positive contributor to output growth in South Africa? Further, what else besides growth in factor inputs might come to raise real output? The rising contribution of TFP growth gives us one indication - and raises a set of questions that arise from contributions

each weighted by its factor share. Evidence to emerge from this simple growth accounting decomposition can only be understood to be broadly indicative. The literature on growth accounting since the contributions of Denison (1962, 1967, 1974) has provided further sophistication to the decomposition, and further extensions have emerged due to the developments in endogenous growth theory (for a useful overview of the developments see Barro 1998, and for the South African context see Fedderke 2002a).

[75] See the more detailed discussion in Fedderke and Mariotti (2002).

[76] See the more detailed discussion in Fedderke (2001a), and Fedderke, Henderson, Kayemba, Mariotti and Vaze (2001).

[77] See Fedderke (2002a) for the full empirical evidence.

[78] In the more detailed evidence of Fedderke (2002a) we also present evidence on real cost reduction contributed by each economic sector, following the methodology of Harberger (1998). The implication of the findings is that technological progress in the manufacturing sectors is highly concentrated in individual sectors, rather than generalized across all manufacturing sectors. Moreover, the sectors contributing most significantly to economic growth prove to volatile across time, making the targetting of innovation incentives by policy makers difficult.

made to new growth theory. How in particular are we to understand the role of human capital, and the contribution of explicit innovative activity (R&D) to TFP growth and hence output growth?

It is to this set of questions that we now turn our attention.

8.2 *The Foundation of Long Run Growth: Investment in Physical Capital Stock*

A core determinant of long run economic growth is the investment rate in physical capital stock in the economy. No matter whether we are referring to classical theories of economic growth or modern endogenous theories of economic growth, investment in physical capital is consistently a primary source of growth. Empirical investigations confirm the centrality of the investment rate in physical capital. Levine and Renelt (1992) famously establish it as the single most robust variable in empirical cross-sectional growth studies. De Long and Summers (1993) confirm its importance as central motor behind long run improvements in per capita GDP.

This provides us with the obvious starting point for any investigation of long run growth determinants in the South African economy. An understanding of the drivers behind South African investment must form the most basic building block in coming to an understanding of the augmentation of South Africa's physical capital stock, and hence the growth rate of output.

In the discussion that follows we draw on work on the characteristics of South Africa's capital markets. We begin with a consideration of evidence on the determinants of investment expenditure.[79] Further, in South Africa the private savings rate has never been able to match the private sector investment rate (see Figure 3). In such a context the characteristics of the financial sector in the economy becomes vital. We consider the role of the financial sector in two ways. First, we extend our discussion of conditions in South African capital markets to a consideration of the importance of international capital flows for investment in South Africa. Considering the determinants of such international capital flows to South Africa then becomes a natural extension to our discussion of investment in physical capital stock.[80] Second, we consider the structure of South Africa's domestic financial markets, and the role they have played in South Africa's growth performance.[81] Finally, the evidence on the determinants of investment in physical capital stock points to the importance of a reduction in uncertainty as a means of stimulating investment expenditure. One way of doing so is to maintain macroeconomic stability. We therefore also consider the impact of macroeconomic stabilization policy in the long run growth process.[82]

8.2.1 *Econometric Evidence on the Determinants of Investment in South Africa*

The modern theory of investment expenditure has come to be focused on the impact of irreversibility and uncertainty. While recognition of the importance of these two determinants of a changing size of the capital stock have been long recognized, recent contributions to the theory have provided a more comprehensive understanding of the issues. Most important of these insights has been the recognition that the impact of uncertainty on investment is ambiguous instead of unambiguously positive as the early literature suggested.

Early work on the link between investment and uncertainty recognized that uncertainty would be of material concern whenever firms make irreversible commitments before the state of the world relevant to the pay off that is to be generated by the commitment is realized. The main finding from this early literature was that under constant returns to scale production technology, and assuming uncertainty to attach to output price, the marginal product of capital is convex in the uncertain

[79] In this instance we draw extensively on the discussion and evidence contained in Fedderke (2001a).
[80] For this evidence we draw on the discussion in Fedderke (2001b), and Fedderke and Liu (2002).
[81] Here we draw on the evidence presented in Kularatne (2002).
[82] The discussion draws on Mariotti (2002).

output price, such that rising uncertainty raises the marginal valuation of an additional unit of capital and hence stimulates investment.[83]

The modern literature has emphasized that such a result need not hold under asymmetric adjustment costs. The discussion tends to be cast in terms of a stochastic dynamic environment. Irreversibility of investment decisions and the possibility of waiting, means that the decision not to invest at the present point in time can be thought of as the purchase of an option. The option has value since waiting to invest in an uncertain environment delivers additional information. Investing now rather than tomorrow thus has an opportunity cost associated with it. One of the core insights of the modern literature is that uncertainty generates a reward for waiting, and hence that increases in uncertainty will potentially lower investment.

However, this is not necessarily the case. A rise in uncertainty does indeed raise the threshold at which investment will be triggered, and it is this which suggests a negative link between investment and uncertainty. However, uncertainty may at least in part be due to an increased *volatility* of profit flows, such that the higher threshold level of profitability is satisfied more frequently than in a certain environment, generating more frequent bursts of investment expenditure. In this case, increased uncertainty may be associated with higher investment expenditure on average, even though the required net rate of return on investment required to justify the investment expenditure has increased due to the uncertainty. The net effect of uncertainty on investment is thus ambiguous, and a matter to be empirically determined.[84]

In the present discussion we examine the determinants of investment expenditure in South African manufacturing industry – though results for aggregate investment rates in South Africa provide further confirmation of the findings reported.[85] Crucial here is that empirical applications of irreversible investment models must control for the impact of uncertainty.[86]

Results from estimation are presented in Figure 4. Results confirm that standard theoretical expectations on the rate of return on capital and the user cost of capital are satisfied. A rising expectation on the rate of return on capital, and rising user cost of capital serve to raise and depress the investment rate in physical capital stock respectively. In this regard investment in physical capital stock in South Africa is thus susceptible to the standard policy levers associated with stimulating investment expenditure.

The striking finding is that uncertainty exercises a statistically significant and strong effect on investment expenditure in South African manufacturing industry (see the comparison afforded by use of standardized coefficients) . Moreover, the effect of uncertainty on investment is unambiguously such as to lower investment rates. Lastly, in establishing the impact of uncertainty on investment expenditure, it is vital to recognize that both systemic[87] and sectoral uncertainty[88] appears to be pertinent for investment - though systemic uncertainty has a stronger impact than does sectoral uncertainty. This result is a consistent and robust finding regardless of which other variables are controlled for in estimation.[89]

One explanation for the poor investment performance of the South African economy is thus the pervasive uncertainty that has characterized, and continues to characterize South Africa.

A further implication that emerges from the empirical findings is that the standard policy handles deemed important as a means of stimulating investment expenditure are found to be significant. Both the proxy for the rate of return on capital stock, as well as the marginal cost of investment come to determine the long run investment in South Africa. The implication of this is twofold. In the first

[83] For a review of the early literature, such as Hartman (1972) and Nickel (1978), see Aiginger (1987).

[84] A comprehensive coverage of the modern debate can be found in Dixit and Pindyck (1994).

[85] See Fielding (1997, 2000).

[86] See for example Ferderer (1993), and Guiso and Parigi (1999).

[87] See the Appendix for detail on this index.

[88] Measured as a moving average of a variance of output demand measure by sector.

[89] In estimation we also tested for the impact of credit rationing, openness of the manufacturing sectors to international trade, technological progress, the skills composition of the labour force, the real wage, and government crowd-in.

instance the impact of factors that change the user cost of investment (or rate of return on capital) - such as taxation rates for instance - can come to act either as deterrent or as enabler to investment. Since changes in the real user cost of capital influence the investment rate of manufacturing sectors, changes in the elements of real unit cost that government can influence will also carry with them long run changes in investment rates. The corollary is that policy makers play a role in creating the appropriate conditions for rising investment rates through an alteration of the real user cost of capital.

Unfortunately the uncertainty findings come to modulate this finding significantly, however. The uncertainty findings carry with them both *direct* and *indirect* policy implications. First, the direct policy implications arise from the direct (and large) negative impact of uncertainty on investment. Thus stability at a systemic level appears crucial if investment rates in South African manufacturing industry are to rise. This carries implications both for the conduct of macroeconomic policy and the need for an emphasis on price stability in its conduct, but also for the importance of creating a stable political environment able to pursue credible policy orientations over time. By the latter we refer to the importance of creating a policy environment that renders the policy making process predictable, rather than subject to problems of time inconsistency. Past political dispensations in South Africa with their associated large discretionary power vested in the state, rendered the prospect of arbitrary state intervention ever real. The move to a liberal democratic polity has lowered this source of uncertainty and we have seen sound economic reasons for guarding this political advance jealously.

But the importance of uncertainty to investment arises in more than the direct sense noted above. The evidence presented has affirmed the importance of uncertainty in *lowering* the investment rate in South African manufacturing. This confirms not only the importance of adjustment costs as determinants of investment expenditure, but also that uncertainty raises the threshold rate of return below which investment is unlikely to occur. At least two further important policy implications flow from this finding. First, it implies that any policy intervention designed to stimulate investment expenditure may face serious constraints in the sense that it may appear ineffectual due to the influence of the relatively high threshold below which investment is simply not triggered. Where an industry is operating below the threshold rate of return on investment, policy intervention may in fact be altering the rate of return on investment and hence the incentive to invest, but may not trigger a physical investment response because the intervention has not been substantial enough to breach the threshold. Thus there may be considerable scope for changing investment incentives by means of policy intervention, without any appreciable change in the investment rate following. The second policy implication then follows as a corollary. The creation of a macroeconomic as well as microeconomic environment that is stable, predictable and devoid of sudden and arbitrary intervention is a policy goal that emerges from the present study, not only because uncertainty has a direct negative impact on investment rates in manufacturing, but also because it serves to lower the threshold below which investment does not occur. In effect lowering uncertainty carries both a direct positive stimulus to investment, and it serves to render other policy levers more effective in achieving their objective.

For the time being we rest the case on uncertainty at this point. What will become evident from the further evidence presented below is that the relevance of uncertainty is deeper than its immediate significance in the context of investment in physical capital stock.

8.2.2 *Extensions of the Debate on the Determinants of Investment in South Africa*

The direct determinants of investment in South Africa have been identified in the preceding discussion. But a number of additional factors are also of importance. In the discussion introducing the importance of investment expenditure, we pointed to the existence of a short-fall of private sector savings relative to investment in South Africa. This raises the significance of the role of the financial sector in the South African economy in at least two distinct senses. First, it immediately

identifies the need for inflows of foreign capital into the South African economy – as is standard for developing countries. Understanding the determinants of capital flows into and out of the South African economy becomes a key to an understanding of constraints on the investment rate in the economy. Second, it raises the question of the efficiency of the South African financial sector as an intermediary between savers and investors in the economy. The crucial question here is what role the financial sector has played in effectively intermediating between economic agents with surplus funds (savers), and those with opportunities to productively utilize those funds (investors). The nature and role of the financial sector in the South African growth process becomes relevant.

A further consideration arises from the possibility that demand side policy intervention may create an environment conducive to long run capital accumulation. The argument here is that macroeconomic stability is crucial in creating appropriate *levels* of the net return on physical capital to render investment attractive to the private sector but, above all, it is viewed as crucial in rendering the return *certain*. In effect, demand-side policy intervention is viewed as an important channel by which uncertainty faced by investors can be minimized. Here too, then, is a dimension which is also relevant to the assessment of the wider enabling environment for investment in physical capital stock.

8.2.3 *The Role of the Financial Sector and Capital Flows*

We have identified two important senses in which the role of the financial sector is relevant to the growth process in South Africa. First, we are concerned with the determinants of capital flows into the South African economy, as a means of relieving the savings constraint on investment in physical capital. Second, we are concerned with the impact of the financial sector on economic growth directly, as a determinant of the savings constraint in the economy.

We turn to these two questions in turn.

8.2.4 *The Importance of Capital Flows: the return of uncertainty*

A long-standing structural constraint in the South African economy has been the short-fall of savings relative to the investment needs of the economy – see Figure 2 above. Except for very brief periods in the 1960's and the early 1980's South Africa's private sector has not produced sufficient savings to cover its demand for physical capital formation. The implication is that South Africa has been, and remains reliant on capital inflows in order to finance its physical capital formation.[90]

On the presumption that capital flows respond positively to higher domestic returns on assets, and negatively to risk and higher returns on foreign assets,[91] and employing a range of distinct measures of capital flow,[92] we report on estimates of the determinants of capital flows in Figure 5.

The crucial point to emerge for purposes of the present discussion is that the results do conform to the portfolio theoretic expectations generated by the theoretical discussion contained in Fedderke (2001b). Thus an improved rate of return on assets, and reduced risk on assets will increase capital inflows into South Africa - though there are some differences between the various capital flow measures on the imputed magnitude of the impact the various rate of return and risk dimensions.

The second point is that capital flows in South Africa prove to be sensitive to political risk. We note that both changes in the level of political rights, and the level of political instability impacts on capital flows. Higher instability, and political liberalization in South Africa both served to stimulate capital outflows. We note further that it is difficult to argue that the three capital "flight" measures

[90] A factor that must also go some way toward explaining the relatively high interest rates the South African economy maintains.

[91] For the detail, see Fedderke (2002b).

[92] Estimations are for the standard short and long term capital flow measures reported in the balance of payments (TNORM), and three measures of capital flight constructed according to the indirect method (KFIND - see World Bank 1985 for its construction), the balance of payments method (KFBOP – see Cuddington 1987), and the derived method (KFDRV – see Dooley 1988).

are more responsive to risk than the "normal" capital flow measures of the balance of payments - with the one exception of the KFDRV measure.

Estimation results thus establish a number of concrete and constructive results. Estimation results suggest that capital flows for South Africa show strong sensitivity to risk factors, and political risk factors in particular. We note that both changes in the level of political rights, as well as the level of political instability impacts on capital flows. Greater instability, and political liberalization in South Africa both served to stimulate capital outflows.

The risk dimensions that proved to be crucial for investment in physical capital stock in South Africa directly, thus transfer their importance to one of the crucial enabling conditions for investment in South Africa. Given the short-fall of private savings relative to investment expenditure, we continue to rely on capital inflows into the economy. Short of achieving an increase in the social savings rate therefore, South African reliance on capital inflows strengthens the need to minimize any source of uncertainty that may detract from investment directly, or from capital inflows. Transparency, predictability, credibility of political processes will serve a crucial role in determining whether the process of democratization in South Africa brings about economic as well as political benefits for the majority of the South African population.

Further, to the extent that the aggregate growth measure contributes to the long run determination of capital flows, the implication is that capital inflows follow on from the creation of favourable growth prospects. Capital inflows are thus potentially secondary stimuli to economic growth, in the sense that they themselves respond to already favourable growth performance. Of course, the additional capital inflow may further enhance the growth in output.

Capital flows and flight have become more favourable to South Africa since the early 1990's. However, lowering political uncertainties, and the need to offer healthy rates of return to potential investors should continue to be a central concern of policy makers.

8.2.5 *The Role of the Financial System*

The financial system can no longer be regarded as a passive channel that allocates scarce resources to the most efficient uses. Today most economists agree that the financial system is essential for development.[93] They argue that a more efficient financial system leads to higher growth and reduces the likelihood and severity of crises.

Kularatne (2002) investigates the role of financial deepening in South African growth in the post-war era. The study allows for both direct effects of the financial system on growth, as well as indirect effects via a stimulus of the investment rate in the economy. In addition, Kularatne allows for the possibility that a rising level of per capita output (as an indicator of the level of development) may itself serve to stimulate the development of the financial system, i.e. that there may be feedback from output to the extent of financial deepening. Finally, the study controls for both the impact of credit extension by financial intermediaries in the South African economy, as well as the liquidity of the stock market.[94]

The crucial findings to emerge from the study are:[95]

- That both forms of financial deepening (both credit extension and stock market liquidity) have a *positive* effect on per capita GDP in South Africa.
- The impact of financial deepening on GDP is *indirect*, operating via the investment channel rather than on output directly.
- There exist feedback effects from per capita output to financial deepening.

[93] For example see Levine (1997), Levine and Zervos (1998) and Levine, Loaysa and Beck (2000).

[94] This serves as the proxy for the ease of raising capital on equity markets in a wide range of international studies.

[95] The study is based on time series data covering the 1952-92 period. Estimation is by Johansen Vector Error Correction techniques.

- Development of the equities market appears to have stimulated investment in physical capital, and hence output. Credit extension appears to have fuelled the development of the equities markets in South Africa, and only through the equities market the development of capital and output.

- In particular, a percentage increase in the ratio of total value of shares traded increases the investment rate and per capita output by 0.28 percent and 0.30 percent, respectively. A percentage increase in credit extension and per capita GDP increases the ratio of value of shares traded by 0.26 percent and 0.83 percent, respectively. The effect of a percentage increase in credit extension on per capita GDP and the investment rate is estimated to be an increase of 0.08 percent and 0.07 percent, respectively.[96]

- The two dimensions of financial deepening are thus complementary to one another. Specifically, credit extension in the South African financial markets appears to serve as a means of improving the liquidity of the stock market, rather than increasing investment in physical capital stock directly. This may reflect the historic role of the South African mining houses as a means of raising capital on international markets. The financial deepening variable with the direct real effect, is the measure of stock market liquidity.

Although one measure of the financial system (liquidity) affects per capita output indirectly via the investment rate, credit extension appears to have no direct influence on the real sector. One possible explanation for the absence of a direct association between financial intermediation and the real sector may be attributed to the presence of credit rationing within the South African economy. Firms may find it difficult to source working capital from financial intermediaries for investment projects. Indeed this is borne out by the evidence gathered by a recent World Bank Report on the constraints to growth in South Africa,[97] which supports the argument of the prevalence of credit rationing within the South African economy.

Thus the central finding of the Kularatne (2002) study on the impact of the South African financial system on long run growth supports the suggestion that financial deepening stimulates economic growth. However, the impact of financial deepening is indirect, and operates by stimulating investment in physical capital. Moreover, the findings suggest that the full potential growth stimulus of the financial sector in South Africa has not been realized, since there do appear to exist some constraints on the efficiency with which financial markets operate in South Africa. Credit rationing may therefore have constrained investment rates in the economy.

8.2.6 *The Role of Demand Side Policy*

As a final consideration under the examination of determinants of investment in physical capital, we consider the role of government stabilization policy. One important implication of demand side policy intervention is that it may create an environment conducive to long run capital accumulation. The argument here is that macroeconomic stability is crucial in creating appropriate *levels* of the net return on physical capital to render investment attractive to the private sector, but above all it is viewed as crucial in rendering the return *certain*. In effect, demand-side policy intervention is viewed as an important channel by which uncertainty faced by investors can be minimized.

Mariotti (2002) investigates the impact of two indicators of demand side policy in the post-war South African growth: government consumption expenditure as a proxy for fiscal policy stance,[98]

[96] Note that the relative effect of increases in liquidity vis-a-vis credit extension on per capita GDP may be exaggerated in the model. The variable measuring liquidity (ratio of value of shares traded to GDP) may be responding to a larger set of variables than specified in the model, leaving open the possibility of misspecification.

[97] See World Bank Report (2000). The survey covers the 1998-99 period.

[98] Government consumption expenditure is utilized as a ratio to GDP. Government consumption expenditure consists of remunerations, depreciation of fixed capital and intermediate consumption less fees and charges. It does not include expenditure on education.

and the inflation rate as a proxy for monetary policy orientation.[99] The study allows for both direct effects of policy on growth, as well as indirect effects via a stimulus of the investment rate in the economy.

The central findings to emerge from the study are:[100]

- In the long run increases in government consumption expenditure and inflation lead to declines in output, such that the economy moves to a lower steady state.
- There is a very short lived temporary increase in growth in response to expansionary demand side policy. The stimulus is not sustainable. The dynamics indicate that the movement to the new steady state is not linear, beginning with an increase in the growth rate of output as government consumption expenditure and inflation increase, followed by a decline in the growth rate of output as the new steady state is approached.
- The presence of a non-linearity in the association between the policy intervention and growth finds confirmation.
- The presence of both direct and indirect (on investment) impacts of policy intervention finds confirmation.
- The optimal ratio of government consumption expenditure to GDP is less than 12%, and potentially below 6%.[101]
- The optimal inflation rate appears to lie below 3%.

The significance of the findings on the interaction between demand side policy and growth in South Africa, is that they confirm the evidence reported in the international literature in terms of the direct impact of government consumption expenditure on output. Government consumption expenditure and inflation are both found to have an unambiguous negative impact on long run per capita GDP. But the results also indicate that there is an indirect impact of policy on output via its impact on investment. Finally, the results suggest that the relationship between policy and long run output as well as investment may be non-linear, implying the presence of an optimal level of government consumption expenditure and inflation.[102] The optimal level of government consumption expenditure is low (below 12% of GDP), as is optimal inflation (below 3%).

The significance of the findings on demand side policy intervention in South Africa is that they do play a role in the growth process. But their significance is not as a means of providing positive demand-side stimulus to output growth. At best the positive stimulus proves very short lived, only to be succeeded by contractionary pressures. Instead, the role of government stabilization policy is to provide a stable and predictable macroeconomic environment – lowering uncertainty in the economy, improving predictability of the economic environment for investors, while providing public goods services.

In short there is no demand side policy panacea to the supply side problem of economic growth. But the demand side has a role to play: to keep as stable and predictable as possible, without distorting private sector incentives.

[99] The inflation rate is computed from the CPI.

[100] Estimation proceeds both in terms of Johansen vector error correction techniques, as well as threshold autoregressive regression techniques in the presence of non-linearity.

[101] Recall that government consumption expenditure is only some proportion of total expenditure. Hence the low ratio.

[102] This si reconciled with the finding of a negative coefficient on the grounds that the estimated relationship is on the relevantly sloped portion of the non-linear association.

8.2.7 *Final Reflection on the Role of Institutions in Economic Growth*

In the discussion thus far we have encountered the importance of institutional determinants both of investment in physical capital stock, as well as capital flows into the South African economy. Uncertainty arising from the nature and instability of the South African political dispensation of the past has undoubtedly had significant impacts on the process of physical capital formation in the South African economy, as well as its ability to attract capital inflows.

An obvious extension to this line of inquiry is whether the need for a consideration of institutional factors as determinants of long run growth prospects is not only more extensive in the sense of requiring attention to a wider range of institutional indicators, but also more extensive in the sense that institutional dimensions may exercise an influence on growth directly, as well as indirectly via capital formation and capital flows.

The possibility of a link between social and political institutions and long run economic development has long been the subject of an extensive literature in its own right. From modernization theory [103] with its postulated positive association between economic and political development, the emphasis on property rights as foundational to long run development in the work of North (1981, 1990) and North and Thomas (1970, 1973), the emphasis on the importance of the credibility of political dispensations,[104] to the recent introduction of social capital,[105] explorations of the possibility of a link between institutions and economic development are a recurrent theme in the literature. Theoretical forays have been accompanied by a growing body of empirical evidence.[106] Finally, within the South African context there is also the long-standing debate on whether the political institution of apartheid proved to be growth enhancing or retarding.[107]

Interpretations of the evidence should be undertaken with some measure of care, however. The theory underlying the link between institutions and economic growth is still under development, and as a consequence interpretation of empirical specifications is not without ambiguity.[108] Moreover, there is no reason to suppose that the nature of the link between institutions and output is homogeneous across countries.[109] If so, there is considerable scope for further explorations of the link between institutions and economic development in more detailed clinical examinations of country-specific case studies. Fedderke, De Kadt and Luiz (2001b) represents one such attempt for the case of South Africa, exploring the role of political instability, political rights and property rights [110] in South African growth processes in a time series context employing long runs of data. In the process the questions outlined in the introduction to the present section of this paper are explored in greater detail. Which institutional dimensions are important to the growth process in South Africa, and are the channels of influence direct or indirect?

Results obtained through the econometric investigations do suggest some clear patterns of association between the institutional and economic variables incorporated in the study. Figure 6 summarizes the findings, which are consistent with the evidence already presented on the investment function above, but also add additional nuance.[111] First, note that the crucial *impact* of the institutional dimensions on economic growth in South Africa appears to have been on the capital-labour ratio. Moreover, the empirical evidence suggests that both political instability *and* property

[103] See for instance the classic Lipset (1959), while Diamond (1992) provides a useful overview of subsequent developments.

[104] See for instance Borner, Brunetti and Weder (1995).

[105] See Coleman (1988, 1990), Putman (1995) and Fukuyama (1995a, 1995b).

[106] Barro (1991) is the classic reference.

[107] This is a tired and hackneyed old debate. For those who do need redirection, see Lipton (1985), and the collection of readings in Leftwich (1974).

[108] See for instance the discussion in Fedderke and Klitgaard (1998).

[109] Fedderke (2001b) demonstrates not only that the steady state characteristics of growth processes are highly sensitive to the nature of the postulated link between institutions and production, but that there is strong empirical evidence to suggest that the link differs fundamentally between countries.

[110] These institutional indicators are again drawn from Fedderke, De Kadt, and Luiz (2001a).

[111] The reader is referred to the paper for the detailed estimation results that underlie these conclusions.

rights are important determining factors of capital accumulation in the South African economy. Thus the evidence suggests that it may indeed be a range of institutional dimensions that are important for long run capital accumulation, rather than just a single isolated aspect of the institutional environment. This represents a potentially important extension to the findings noted on the investment rate noted above. In particular, we should note that the policy need identified above of increased sensitivity to perceptions of stability surrounding the policy making process requires further modulation.

Second, given the long-term nature of physical capital commitments, it would indeed be strange if property rights were not of foundational importance to economic agents who can anticipate the pay-off to their activity only some (often considerable) time in the future, often subject to considerable risk quite apart from any ambiguity they face in ownership. Where the agent who is responsible for setting the rules of the game that constitute the institutions in terms of which we undertake economic activity is not seen to be fully and *credibly* committed to those rules which confer ownership in the pay-off agents obtain for the risk they undertake, confidence and hence investment is inevitably going to be compromised.

Third, little evidence emerges suggesting that the institutional variables impact on output directly in addition to the indirect link via the investment rate. Instead, economic development as measured by the level of real per capita output comes to drive institutional development both in terms of the rights structure within the political realm, as well as in terms of the level of political instability that prevails in South African society.

Fourth, note that the evidence favours the liberal rather than the Marxist interpretation of South African economic history. The evidence does not support the idea that political rights supported either capital accumulation or per capita output in any way. Instead, political institutions appear to be an outcome variable rather than a forcing variable in the estimations. Instead, political instability and property rights appear to have precisely the effects that the liberal argument predicted: instability generating harmful impacts, and improved property rights positive impacts on capital accumulation.

Finally, it is worth emphasizing once again the fundamental significance of the findings reported above and in the section on investment for the conduct of economic policy. On the basis of evidence that has emerged both on the domestic economy and internationally, [112] there is little doubt that the pursuit of macroeconomic stability is vital as part of growth enhancing economic policy. But macroeconomic stability is only a part of the story, and one might argue the easy part. Far more demanding is the need to establish that the policy commitment is a credible one, and that the institutional framework within which it is achieved is one that will itself hold and allow economic agents to realize the fruit of their labour.

Where institutional stability requirements are not met, we stand to lose the benefits that should accrue due to the commendable and considerable achievements that South Africa has realized through its strict macroeconomic discipline.

9 Labour Market Inefficiencies

From the opening sections of the paper we have already seen that the South African labour market has contributed in declining measure to long term South African growth. For this reason the lack of attention paid to the mispricing and hence resource misallocation, as well as the labour market rigidities that characterize South African labour markets is astonishing.

The point about the importance of inappropriate pricing and rigidities in South African labour markets is arguably one of the single most widely documented characteristics of the South African economy to have emerged during the course of the 1990's. The wage elasticity of employment has

[112] See the preceding discussion and Mariotti (2002) on evidence on the impact of macroeconomic policy on South African long run economic growth.

time and again been found to be negative in empirical study after empirical study. Supporting descriptive evidence points in the direction of continuing rigidities creating obstacles to employment creation. Readers who require additional evidence are referred to discussions in Lewis (2001, 2002), Arndt and Lewis (2000), Nattrass (2000), and Fields (2000), all of whom contain references to yet further evidence.

In this section we detail four additional pieces of evidence relevant to an understanding of the problem of labour mispricing, and employment losses in the South African economy. First, we examine evidence to emerge from the mining sector specifically, in which employment losses are particularly severe during the course of the 1990's. Secondly, we consider evidence on the linkage between labour productivity, the real wage and employment creation, considering both descriptive and econometric evidence. Third, we consider some preliminary evidence on the impact of labour skills on the wage elasticity of labour demand. Finally, we examine the impact of trade liberalization on the demand for labour in South Africa.

9.1 *The Role of the Mining Sector on Employment*

Mining has traditionally constituted one of the principal employers of the South African economy. For this reason it is instructive to consider employment trends in the mining sector – since it gives some useful preliminary evidence on relevant structural features of the South African labour market more generally. In examining this evidence, we draw extensively from the evidence presented in Fedderke and Pirouz (2000).

We identify two salient features of the labour market in mining.

First, there has been a substantial amount of labour shedding in the mining sector during the course of the 1990's, with the employment loss concentrated in unskilled occupational categories. This is illustrated in Figure 7, with reference to Gold & Uranium Mining, but is repeated in other mining sectors (see Fedderke & Pirouz 2000 for additional detail). More generally, employment in the three principal mining sectors fell from a high of 101705 employees in Coal Mining in 1985 to 55219 in 1997, for Gold & Uranium Mining the decline was from 526839 to 241352 employees over the same period, while for Diamond & Other Mining employment declined from 199572 in 1990 to 136543 in 1997. In short, employment losses in the mining sector have been dramatic over the past decade.

Given the significant historical contribution of mining to employment in South Africa, such significant job losses raise immediate concerns about the reasons for such losses.

Second, a significant contributor to the employment losses in mining has been the real cost of labour in production.[113] This is readily illustrated by reference to Figures 8 through 10, which show a substantial negative correlation between the real cost of labour[114] and employment trends in all three principal mining sectors of the South African economy, over precisely the period in which substantial job losses have been recorded in these sectors.

The finding is further confirmed by a consideration of the relative rate of increase in labour productivity and the rate of increase in the real cost of labour in the mining sectors. Table 4 demonstrates that over the period in which significant job losses occurred, increases in real labour cost consistently were greater than improvements in labour productivity – with the inevitable consequence that the real unit cost of labour was increasing over the period. That job losses should occur as a consequence is hardly surprising.

Finally, that the real cost of labour has had a significant impact on employment in mining is further supported by more detailed multivariate econometric evidence. The finding in Fedderke and Pirouz (2002) is that the real wage elasticity for the Coal, Gold & Uranium and Diamond & Other

[113] Of course, this does not constrain one to assert that this is the only influence.

[114] Note that the deflator employed in computing the real cost of labour is the relevant producer price index of the sector – not the consumer price index, as is frequently the case in the literature. This is dictated by the relevance of the cost of labour to the producer. See the full discussion in Fedderke & Pirouz (2002) on this point.

Mining sectors was -0.44, -0.69, and -1.45 respectively. The evidence confirms that particularly in Diamond & Other Mining (though also in Gold & Uranium) the impact of rising real costs of labour have been potentially very severe (more than proportional), even when other contributing factors to employment have been taken into account.

The core implication to emerge from the mining sectors of South Africa is therefore twofold. First, employment losses have been severe, particularly in unskilled labour categories. Second, we have a first intimation of the fact that mispricing of labour is a significant contributor to the employment losses.

Given that it is the fact that labour shedding has been the reason for the negative contribution of labour to aggregate growth in South Africa, this gives a first indication of the possibility that labour market inefficiencies constitute an important growth constraint on the South African economy – particularly during the period after 1985.

9.2 *Widening the Evidence to Other Sectors of the Economy*

The finding that labour mispricing constitutes a significant constraint on employment creation in South African mining, and hence acts as a brake on the economies growth performance, generalizes to other economic sectors.

In Fedderke and Mariotti (2002) the impact of the link between the rate of increase in labour productivity and the rate of increase in the real wage on employment creation is considered for all 48 sectors of the South African economy, again over the 1970-97 period. The finding to emerge is dramatic: only where there is a strong positive correlation between growth in real labour remuneration and growth in labour productivity do economic sectors in South Africa create jobs on a sustainable basis.

We illustrate the point by reference to Figure 11. What is clear from the figure is that the greater is the congruence between growth in labour productivity and growth in real labour costs, the greater is the positive growth rate in employment.

Noteworthy is the distinct performance of these groupings of economic sectors in terms of the growth of employment and real labour remuneration they experienced over the full sample period. The strength of the correlation between labour productivity and the real wage appears to be a predictor of the strength of sustainable real wage improvements, as well as growth in employment.

With the exception of perhaps only the sector grouping with a correlation between +0.7 and +0.8, the evidence appears to suggest the presence of a declining employment creating capacity in sectors as they conform less closely to the dictates of standard economic theory. Where the real wage is less closely linked to real labour productivity, the growth in employment also tends to be lower. Moreover, the capacity for a heightened but sustained increase in real wages also appears to be linked to the degree to which real wages are justified by labour productivity.

The immediate implication for policy intervention in South African labour markets appears to be that "well-functioning" labour markets, defined as those that link factor rewards to factor productivity in accordance with the requisites of economic theory, appear to be more likely to generate both employment, and sustained improvements in labour remuneration. In effect, to the extent that by labour market flexibility we mean the capacity of labour markets to adjust freely and rapidly to the market clearing wage suggested by labour productivity, the evidence from the link between real labour productivity and the real wage suggests that labour market flexibility is desirable.

The evidence extends further.

Considering a range of econometric evidence on real wage elasticities confirms the strong impact of the cost of labour on employment prospects in the economy. For the 28 manufacturing sectors of the South African economy, the aggregate real wage elasticity found by Fedderke and Mariotti (2002) is in the region of -0.5 - -0.55. But in a fuller specification, which controls for demand effects, skills composition of the labour force, openness of economic sectors, capacity utilization in sectors,

as well as industry concentration, the wage elasticity can be found to rise to -1.97 for manufacturing (see the extensive discussion of the estimation issues in labour markets in open economy contexts in Fedderke, Shin and Vaze 2003).

In a more detailed examination of the impact of the skills composition of the workforce on employment, the impact of the real cost of labour is even more dramatic. In Fedderke (2004) the impact of the real cost of labour on employment is explored separately for highly skilled, skilled and unskilled & semi-skilled workers for formal employment in the South African economy. The finding is consistently of negative wage elasticities for unskilled labour, with the wage elasticity for unskilled labour in the formal labour market ranging from -2.00 to -2.23, an elasticity considerably above that for skilled and highly skilled workers.

Given the substantial increases in the real cost of labour in the South African economy, labour mispricing continues to offer itself as a principal cause of the poor track record of job creation, and the negative contribution of labour to long run economic development in South Africa. That the impact of these developments have been particularly focused on the sections of the population least well endowed with human capital, only serves to strengthen the welfare implications.

9.3 *The Impact of Globalization on the South Labour Market*

A final salient question in the current context is whether globalization has served to exercise a negative influence on the South African labour market?

Providing a sound answer to this question is not technically trivial – and the present discussion can only present a brief summary of the core findings of the detailed discussion in Fedderke, Shin and Vaze (2003), which also serves to contextualize the South African evidence in terms of a wide range of international studies.

The findings of the Fedderke, Shin and Vaze (2003) study on the 28 3-digit manufacturing sectors in South Africa are that:

1. Globalization, or trade liberalization, has mandated positive earnings increases in sectors that are labour intensive. This finding thus confirms the effect on labour markets that would be predicted by the Stolper-Samuelson theorem for South African labour markets. The finding is invariant to the methodology used, and emerges from the basic factor proportions approach, the Leamer (1998) mandated wage regression approach, as well as the approach of Feenstra and Hanson (1999) and Haskel and Slaughter (2001) which allows for endogeneity of the technology of production.

2. The implication is thus clear: trade liberalization and globalization has not hurt labour in South Africa. On the contrary, it has increased demand for, and the earnings of labour. This finding is invariant to the methodology used to test for trade effects.

3. By contrast to demand-side effects, technology has mandated negative increases in labour earnings. Technological change in South African labour markets has thus been labour saving.

4. The net effect of the combined demand-side (globalization) and technology effects is such as to raise questions about the magnitude of actual real wage increases in the South African labour markets, once again emerge as a potential source of poor employment creation.

The evidence on the impact of trade liberalization on the South African labour markets thus suggests that the impact of globalization has been such as to expand rather than contract the demand for labour, and labour earnings. On the other hand technological change has been substantially labour-saving. Given the net effect of these two countervailing forces, actual earnings changes have been of an order of magnitude that is difficult to justify, and may serve to explain the poor employment creation capacity of the South African labour markets.

9.4 *Summarizing the Labour Market Evidence*

The findings on South African labour markets are straightforward to summarize.

First, wage elasticities of labour demand are persistently negative in the South African economy, and they are strongly negative. This points to the importance of rising costs of labour as a reason for the poor employment performance of the economy. This is particularly so for a number of labour intensive sectors of the economy, and for unskilled labour, for which the wage elasticity may exceed -2.00. To find the culprit for the poor contribution of labour to South African output growth is thus not difficult. Wage moderation has been insufficiently practiced.

Second, since technology has been labour saving in the South African labour market, the need for wage moderation is even more marked.

Finally, the evidence does not support the notion that trade liberalization has been responsible for labour shedding in South Africa's manufacturing sector.

10 Innovation, Human Capital, and their Relevance to the South African Context

Modern growth theory has come to place increased emphasis on innovation as a long-term driver of economic growth, with explicit attention focusing on the source of technological innovation in the economy. As we saw in an examination of a growth accounting exercise for South Africa earlier in this paper, such a focus is not inappropriate for the South African context – the contribution of growth in total factor productivity has been rising in South Africa.

What is common to many approaches to endogenous growth theory is the presumption that innovation is the outcome of an explicit devotion of resources to technological advance. Where contributions differ is in their identification of the nature and impact of such resources. For Romer (1986)-type models the source of innovation is spill-overs attaching to investment in physical capital stock. For the Lucas (1988)-variant the spill-overs can be argued to emanate from investment in human rather than physical capital stock. Finally, in variants of the Schumpeterian approach to long run growth, innovation is the explicit outcome of the devotion of resources to technical advance, rather than the production of final output.[115]

The crucial question for our purposes must first be whether endogenous growth processes are present in South Africa, and secondly what form such endogenous growth processes might take. The latter is crucial given the divergent policy implications that the alternative conceptions carry. Fedderke (2001g) addresses this set of questions econometrically.[116]

The core question in estimation is whether we can isolate the core determinants of the growth in total factor productivity that we saw in an earlier section to be an increasing contributor to aggregate South African economic growth.

Since the results are symmetrical, we focus discussion on the results for the spill-over specification in Table 5, though the additional modulations to emerge from the Schumpeterian findings are also touched upon. More detailed discussion of these results, including the Schumpeterian case can be found in Fedderke (2001g).

[115] For a non-technical discussion of the generic approaches to endogenous growth theory, and their implications for economic as well as institutional development, see Fedderke (2002c).

[116] The methodology applies dynamic heterogeneous panel analysis to the South African manufacturing sectors. Estimation is of: $TFP = \frac{\dot{A}}{A} + \beta\frac{\dot{X}}{X} + \sum_{i=1}^{m} \gamma_i Z_i$ where $\frac{\dot{A}}{A}$ denotes exogenous technological change, $\frac{\dot{X}}{X}$denotes either growth in physical capital stock (for the Romer (1986) type of approach), growth in human capital (for the Lucas (1988) type of approach), or growth in intermediate inputs or quality ladders (under Romer (1990) or Grossman and Helpman (1992) type approaches), and Z_i denotes a range of additional regressors suggested by the literature. Here we skip the relatively complex range of estimation issues that arise, and proceed to salient estimation results directly. Full discussion of the estimation issues can be found in Fedderke (2001g).

While the results confirm the presence of spill-over effects for South African manufacturing, it is important to note that the confirmation is not unconditional. In the first instance we should note that to the extent that spill-over effects are corroborated, they take the form suggested by Lucas (1988) rather than Romer (1986). The coefficient on the growth rate of the capital stock is consistently negative (even where we control for investment in human as well as physical capital) and statistically significant. Since the coefficient of the capital growth rate should control for the positive contribution of capital stock over and above that implied by its income share due to spill-overs, this constitutes a rejection of Romer-type spill-over effects in South African manufacturing industry.

On the other hand, Lucas-type spill-over effects do find some support, in the sense that at least some of the human capital investment variables prove to have positive and significant coefficients. However, even here the support for Lucas spill-overs is circumscribed. In particular, only very specific types of investment in human capital contribute positively to productivity growth. The proportion of matriculation students sitting mathematics, and the proportion of degrees in the natural, engireering and mathematical sciences (NES) in total degrees are the only two human capital variables that provide a positive and significant contribution to productivity growth in South African manufacturing industry over the 1970-97 period.

By contrast, the total school enrollment rate, and the total number of degrees issued by South African universities, while significant, contributed negatively to total factor productivity growth, while the white school enrollment rate, the total number of NES degrees, and the number of apprenticeship contracts per capita prove to be insignificant.

What counts for purposes of the innovative activity that is coupled to long run output growth in South African manufacturing, is not so much the production of human capital *per se* but the production of quality human capital, as proxied by the math and NES degree proportions. And there are at least two good reasons that make this finding plausible. The first is that quality human capital is simply more likely to have the positive spill-over effects identified by Lucas (1988), while poor quality human capital does not. A second interpretation of the evidence might point to an improved quality of screening by an educational system (both primary and secondary, and tertiary) with rising math and NES degree proportions. This is turn would reduce the risk faced by producers wishing to hire human capital for purposes of innovative activity.

The results of estimations testing the Schumpeterian hypothesis confirm the presence of a positive impact of R&D expenditure on growth in total factor productivity, as postulated by Schumpeterian theory. Thus the findings confirm the presence of the positive impact on output growth of innovative R&D activity undertaken by the private sector. Results from the range of human capital indicators again point to the possibility of a positive impact of human capital spill-overs on productivity growth. However, just as for the spill-over results, the particular dimension of human capital investment controlled for proves to be crucial. The positive impact on productivity growth emerges from the NES degree proportion variable (as it did for the spill-over discussion), while a number of human capital variables prove to be negative and significant (WENROL, APPCAP) or insignificant. The interpretation of this evidence remains much the same as for the spill-over results above. While the human capital dimension can legitimately be argued to have a positive impact on long run productivity growth, it is above all the *quality* dimension of human capital that exercises this effect rather than the quantity of human capital.

The empirical evidence from South African manufacturing industry thus appears to point to a positive impact from both explicit R&D activity, as well as the human capital dimension, particularly the quality dimension of the latter.

The implication is that we can isolate the core determinants of growth in total factor productivity for South Africa. They are investment in quality human capital, as proxied by the proportion of school leavers and university graduates engaged in mathematical, scientific and engineering disciplines, and R&D development activity. Given this evidence, it is not difficult to understand why the South African economy has not realized a stronger growth performance led by growth in total factor productivity.

In Figures 12 and 13 we report the proportion of white and black matriculants sitting mathematics (in any of the three grades available) and the proportion of university graduates by race in the NES degree categories. Table 4 reports the per academic staff research output by university over the 1989-94 period.

The implication of the evidence is clear. In all three indicators of the underlying capacity of the South African economy to undertake long term innovation we have seen substantial decline. The proportion of matriculants in the historically "best" parts of the schooling system has been in steady decline – and in black schooling has been persistently low. Little wonder therefore that the proportion of NES degrees has collapsed. R&D activity in the university system in turn has also shown a steady decline on a per capita basis. Even the best part of the university system in South Africa has at the very least manifested declining quality over time. First, the white university research output has ceased to increase in absolute terms from the late 1980's, and in per lecturer output terms the output declined through to the early 1990's, though it has since stabilized. Also, most research in South Africa is done in a very small number of universities.

The story of South African education has consistently been one of widening access,[117] but at the expense of the system's capacity to deliver on what matters most for long run economic development purposes: sound education in mathematics and science, and a deepening research capacity within the system.

We noted at the outset that econometric evidence on South Africa establishes that there exists a growth impact that attaches to investment in human capital. What was also evident from the evidence was that the growth impact attaches to investment in quality human capital rather than human capital in general.

What emerges from the rest of the discussion in this section is that the educational system in South Africa has placed full weight on widening access, and very little emphasis on improving the quality of the training that it provides. Regardless of whether we are talking of the schooling or the university system in South Africa, even the supposedly "best" part of the system performs relatively poorly in generating the sorts of output that come to count in the long run economic development stakes.

Historically, therefore, the educational systems design in South Africa has not been optimally geared as part of the South African economic developmental challenges. Indeed, the evidence suggests that not only was the output of the educational system poorly suited to growth needs, but the means of achieving what output there was, in the case of the university system at least proved to be expensive both in direct resource requirements as well as in at least some implied foregone opportunities for improvement in what excellence there was in the university system.

11 Conclusion

The analysis has identified the sources of economic growth in South Africa against the backdrop of international economic developments. Between 1870 and 1914, the international regime was one of free capital flows – both direct and portfolio – and free trade. This allowed the diamond and gold industries to establish themselves, the latter requiring and receiving large direct capital inflows. Exports of agricultural goods were also facilitated by a free trade regime. Investment in infrastructure was also substantial. The costliest adverse factors were those which led to the South African war of 1899-1902. While the post-1902 political configuration was more supportive of growth than its predecessor, the war left a legacy of substantial public debt and political bitterness.

In common with many others, the South African economy floundered between 1914 and 1932 with a spell of prosperity between 1922 and 1928. War-time inflation, post-war dislocation, the return to the gold standard and the great depression all had adverse impacts. Nonetheless, the gold

[117] We lack the space to be able to develop evidence of the widening access here. But see Fedderke, De Kadt and Luiz (2000, 2003) for full details.

mining industry navigated its way through difficult times and manufacturing developed throughout the period, aided by natural geographic protection as well as protective tariffs. Manufacturing sectors grew in different ways: many as the result of increased capital and labour inputs, but some as a result of technological progress. South Africa's experience differed from those of its European suppliers of capital and trading partners after 1933, partly because of its status as a supplier of gold and partly because its political stability did not deteriorate in the way that European stability did.

After 1945, savings and investment rates rose. The predominant source of growth within manufacturing was capital-intensification, evidence of which can be found in agriculture as well. South Africa's balance of payments problems could be dealt with within the Bretton Woods framework; even the capital controls imposed after Sharpeville were not that remarkable under an international economic regime which regarded them as a legitimate instrument for use in times of balance of payments difficulties. In the changed international economic environment which took place in the late 1970s, however, the persistence of capital controls functioned as a greater constraint on foreign investment.

It is in the most recent period – since 1970 – that the engines of growth in South Africa have come under greatest stress. The most obvious problem was serious political instability after 1976 which, it has been argued, undermined both the propensity to invest and the inflows of foreign capital necessary to finance such investment, since South Africa has generally been a net importer of capital. But there were other reasons as well. Although technological progress came to account increasingly for economic growth from the 1970s, it did so to a considerable extent by default, with the contribution of both capital and labour growth declining. There is clear evidence of labour market rigidities by the end of the period.

There have been limits on technological progress. The evidence suggests that South African technological progress has been of the Lucas and/or Schumpeterian rather than the Romer type. That is, it derives from investment in human capital rather than physical capital. Moreover, it derives from human capital investments of a specific type - in mathematics, science and engineering – which the South African educational system finds most difficult to produce.

Two factors positive for growth should be noted. Financial deepening has had a positive influence on growth, though credit rationing has remained a constraint up to the end of the twentieth century. South African growth has been well served by relatively conservative monetary and fiscal policy. There have been deviations in the form of high inflation between the late 1970s and the early 1990s and the large budget deficits of the last apartheid years. But it has been recognised each time – also by post-apartheid governments – that these deviations are undesirable and policies have been introduced to rectify them.

How did segregation and apartheid affect economic growth? Segregation, like all systems of discrimination, imposed static efficiency costs on the economy. These costs varied with government policies. The Botha and first Smuts administration imposed lighter costs than the PACT government of 1924-1929 or the Nationalist government of 1929-1933. The PACT government saw the introduction of the civilised labour policy and higher rates of protection. It and the two successive governments increased aid to agriculture. But none of this seriously undermined a respectable rate of growth from 1922 to1928 or the more rapid rate from 1933 to 1945.

The efficiency costs imposed after 1948 were heavier and they stored up trouble for later growth. The central elements of apartheid – complete urban segregation, tightly controlled and poorly funded education for Africans, much more rigorous influx control, rural resettlement to homelands, controls on African ownership outside the homelands – amounted to a massive attempt at social engineering. Political resistance to the programme was contained between 1948 and 1960 and then repressed more strongly during the 1960s. The determinants of growth most strongly affected by these developments were human capital, property rights and an increasing international isolation of South Africa, leading ultimately to adverse impacts on capital inflows. Political instability in South Africa became overt in the period 1976-1994, the period over which real per capital income dropped substantially.

Overt political instability within South Africa has been dramatically reduced since 1994. But

South Africa suffers as a destination for investment from its situation in a rough neighbourhood and from intractable social problems: high unemployment and HIV/AIDS being just two of the most salient of them. And since, as Samuel Huntington points out, democracies are not consolidated until there have been two alternations in power, internal stability is not yet permanently guaranteed. Property rights are guaranteed in the 1996 Constitution, but they can be trumped by expropriation carried out in the public interest, which can include land reform. Proposals for using the financial system to achieve pre-determined ownership goals may not always be compatible with financial market efficiency. The South African educational system – particularly its schools – has to demonstrate that, in addition to producing commitment to democratic values (desirable in themselves), it can turn out hard skills indispensable to growth. It is around these themes that the growth performance of the South African economy in the coming decades will be discussed.

12 Appendix

12.1 The Systemic Uncertainty or Political Instability Index

A measure of systemic uncertainty is provided by an index of political instability obtained from Fedderke, De Kadt and Luiz (2001). It is illustrated in Figure 1. Political instability was latent in South Africa throughout the twentieth century, and became overt often after 1948. The index is a weighted average of eleven indicators of repressive state responses to pressures for political reform. They are constructed from official and unofficial sources,

The indicators are:

- 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 1950;
- the number of people placed in detention;
- the number of political fatalities;
- the number of organizations officially banned;
- the number of actions against "riots";
- declarations of official states of emergency;
- the number of publications subjected to censorship.

Weightings were determined by the Delphi technique on the basis of advice from leading political scientists in South Africa.[118]

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Figure 1: Real Per Capita GDP and the associated growth rate.

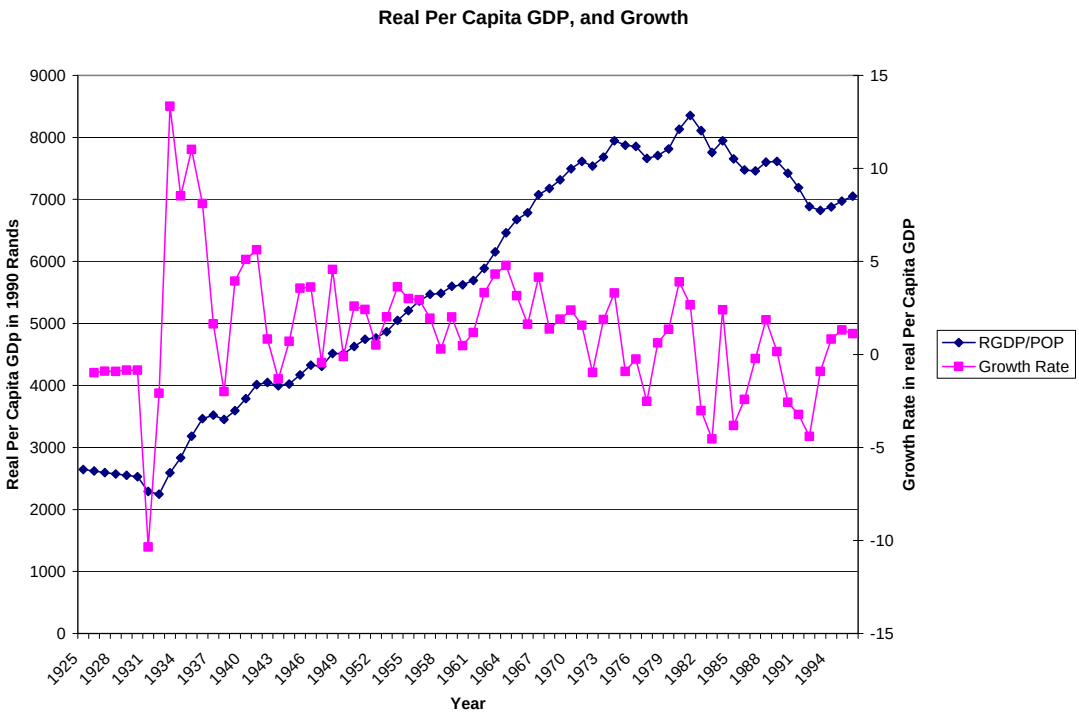
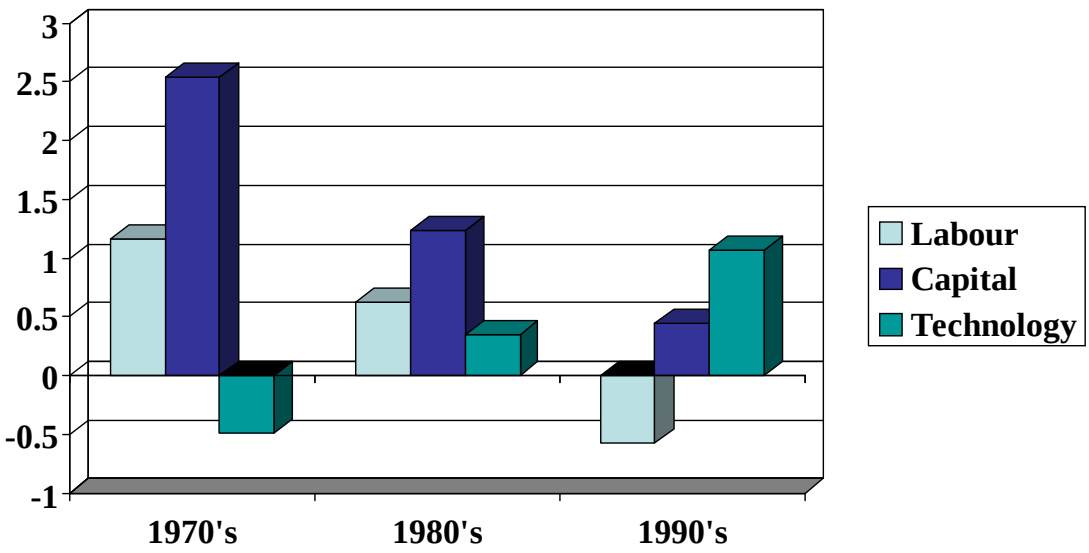


Figure 2: Decomposition of growth in real GDP into the contribution of factors of production and technological progress. Figures are in percent.



Source: adapted from Fedderke (2002a).

Figure 3: Private Savings[1] and Investment Rates[2]: South Africa, 1970-2000.

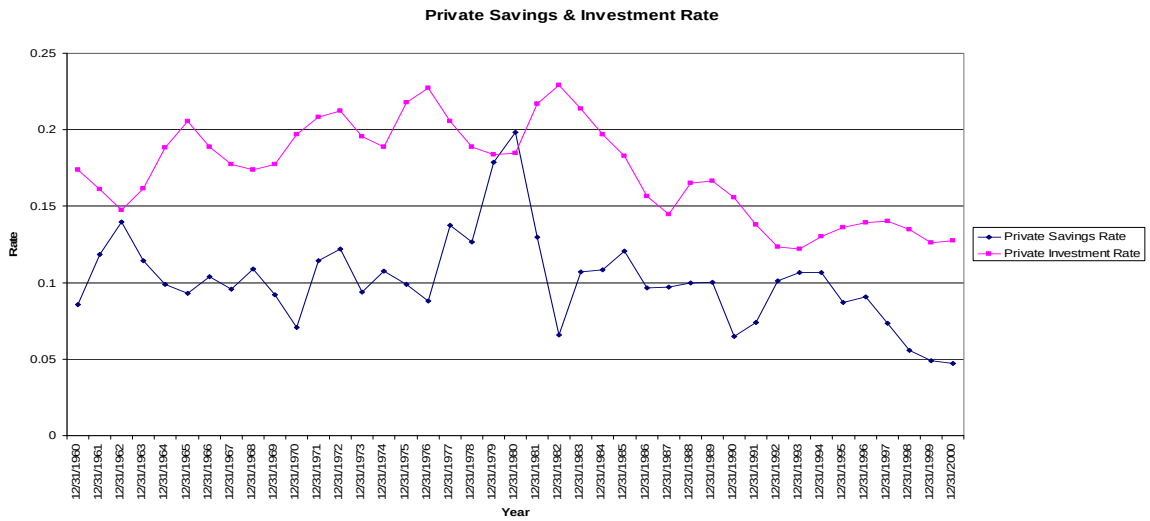
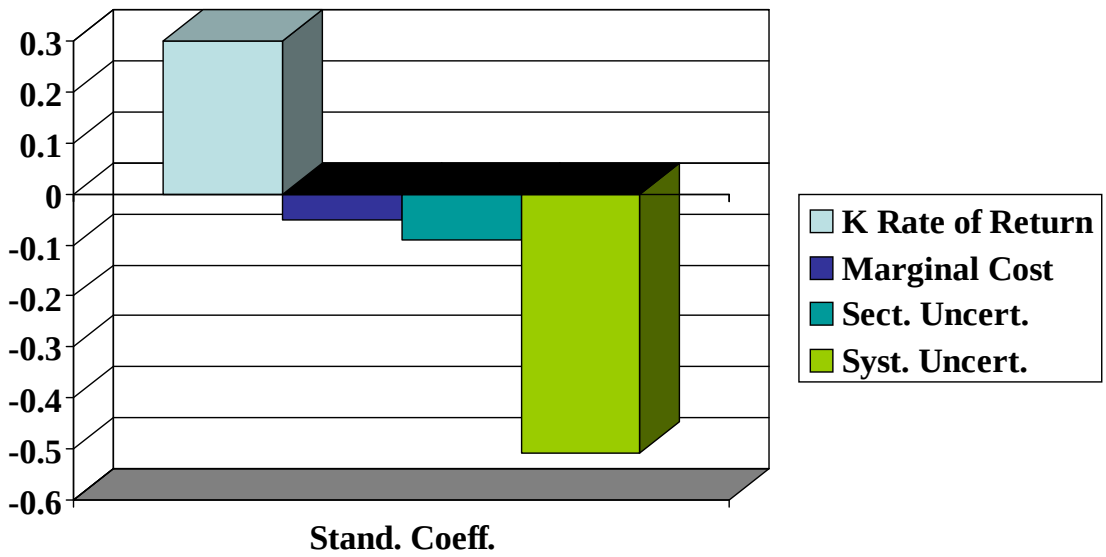


Figure 4: Standardized Coefficients in the Investment Relation.



K Rate of Return denotes the proxy for the expected rate of return on capital

Marginal Cost the user cost of capital

Sect. Uncert. a measure of sectoral demand uncertainty

Syst. Uncert. a measure of systemic uncertainty.[3]

Figures are standard deviations, denoting the standard deviation response in the investment rate to a one standard deviation change in the independent variable. All coefficients statistically significant.

---

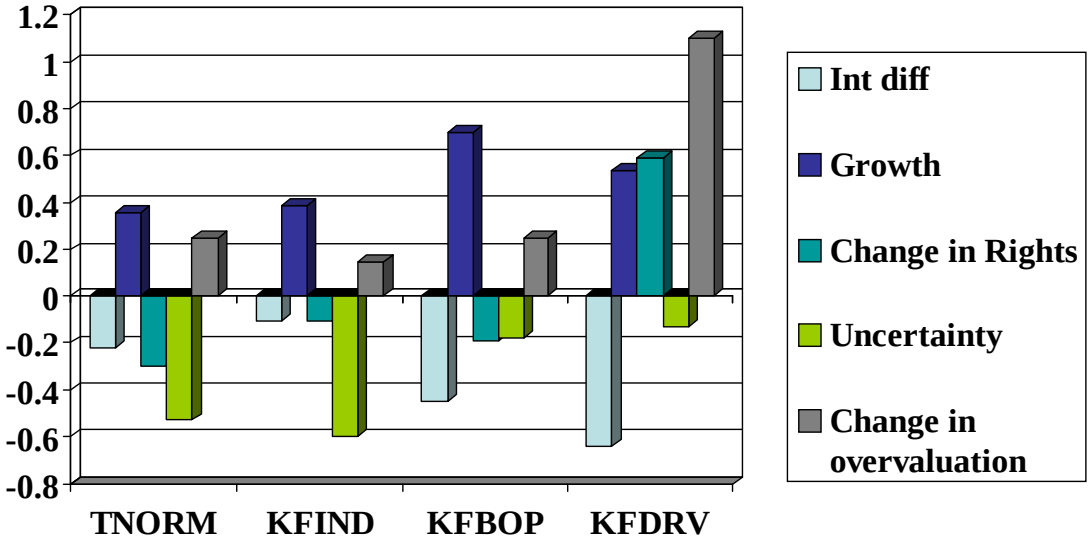
[1] Defined as the sum of corporate saving (Unit: R millions, current prices (Period)) [Source: SARB Quarterly Bulletin (S-129)] and saving by households (Unit: R millions, current prices (Period)) [Source: SARB Quarterly Bulletin (S-131)], as a proportion of gross national product at factor cost (Unit: R millions, current prices (Period)) [Source: SARB Quarterly Bulletin (S-127)].

[2] Defined as the ratio of gross fixed capital formation at current prices by private business enterprises (Unit: R millions, current prices (Period)) [Source: SARB Quarterly Bulletin (S-116)] to gross national product at factor cost (Unit: R millions, current prices (Period)) [Source: SARB Quarterly Bulletin (S-127)].

[3] For the systemic uncertainty measure we employ the data set contained in Fedderke, De Kadt and Luiz (2001a). For the precise definition of the other variables deployed, the reader is referred to the discussion in Fedderke (2001a).

Source: adapted from Fedderke (2001a).

Figure 5: Standardized Long-Run Coefficients from ARDL Estimation

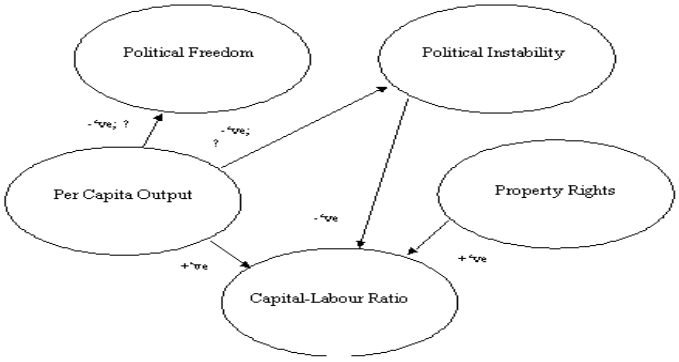


Notes: Int diff denotes the change in the exchange rate adjusted interest differential, defined as the difference between the foreign and the domestic interest rate.[4]
Growth denotes the percentage change in gross domestic product.
Change in Rights is defined as the change in an index of political rights.[5]
Uncertainty refers to the index of political instability employed in the investment estimations reported in Figure 3.
Change in overvaluation is defined as the change in the degree of over/undervaluation of the exchange rate in terms of PPP.
Figures are standard deviations, denoting the standard deviation response in the investment rate to a one standard deviation change in the independent variable. All coefficients are statistically significant.

Source: Fedderke and Liu (2002).

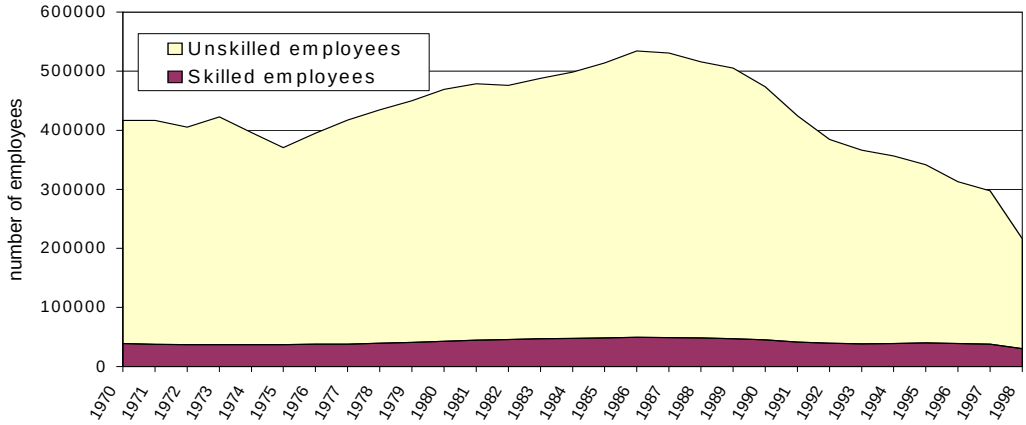
[4] Thus a positive Int diff should trigger capital outflows.
[5] See Fedderke, De Kadt and Luiz (2001a) for a detailed description of the index underlying this variable.

Figure 6: Patterns of Association.



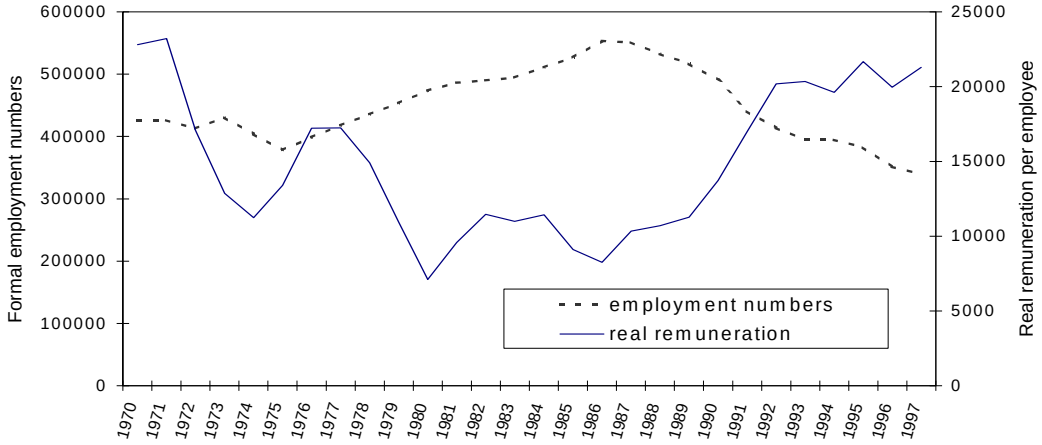
Source: Fedderke, De Kadt and Luiz (2001b).

Figure 7: Gold Mining: Skills Composition of Labour Force.



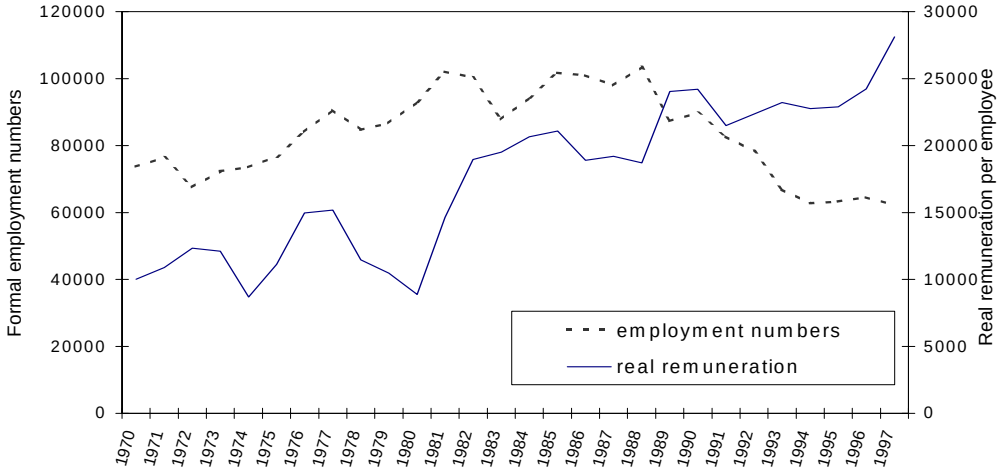
Source: Fedderke and Pirouz (2002).

Figure 8: Coal Mining: Employment and Real Cost of Labour.



Source: Fedderke and Pirouz (2002).

Figure 9: Gold & Uranium Mining: Employment and Real Cost of Labour.



Source: Fedderke and Pirouz (2002).

Table 1: Gross value added by industry, 1946 and 1970 (in constant 1995 rand) (R million)

Industry	1946	1970	1994
Agriculture, forestry and fishing	6 469 (7.2%)	13 182 (4.7%)	24 125 (5.0%)
Mining and quarrying	14 554 (16.3%)	41 783 (14.9%)	35 946 (7.4%)
Manufacturing	9 670 (10.8%)	55 959 (20.0%)	99 706 (20.5%)
Electricity, gas and water	858 (1.0%)	4 888 (1.7%)	17 069 (3.5%)
Construction	2 844 (3.2%)	15 242 (5.4%)	15 233 (3.1%)
Wholesale and retail trade, catering and accommodation	10 062 (11.2%)	38 898 (13.9%)	67 780 (14.0%)
Transport, storage and communication	6 096 (6.8%)	18 910 (6.7%)	40 281 (8.3%)
Financial intermediation, insurance, real estate and business services	13 371 (14.9%)	40 254 (14.4%)	79 378 (16.3%)
General government services	18 255 (20.4%)	38 532 (13.8%)	80 157 (16.5%)
Community, social and other personal services	7 351 (8.2%)	5 081 (1.8%)	12 420 (2.6%)
Other producers		7 488 (2.7%)	13 687 (2.8%)
Gross value added at basic prices	89 530	280 217	485 782

Source: Statistics South Africa: *South African Statistics 2002*: 19.3-19.4

Table 2: Sources of manufacturing growth between 1920 and 1945.

Capital Intensive Growth	Labour Intensive Growth	Total Factor Productivity Growth
Tobacco	Wearing Apparel	Food
Wood (1920's)	Wood (1930's)	Beverages
Paper	Furniture (1920's - 1930's)	Furniture (1940's)
Printing & Publishing (1920's&1930's)	Chemicals	Printing & Publishing (1940's)
	Non-metallic Minerals	Textiles
		Leather
Rubber & Plastics (1920-4, 1934-9)		Rubber & Plastics (1925-33, 1940-5)
Basic Metal Industries (1920-4, 1940-5)	Basic Metal Industries (1925-39)	
Metal Products (1920's)		Metal Products (1940's)
Machinery (1920's)	Machinery (1930-45)	
Electrical Machinery (1934-9)		Electrical Machinery (1925-9, 1940-5)
Motor Transport (1920-24)		Motor Transport (1930-45)

Source: Fedderke and Schirmer (2004).

Table 3: Sources of manufacturing growth between 1945 and 1969

Capital Intensive Growth	Labour Intensive Growth	Total Factor Productivity Growth
Food Beverages Tobacco Textiles Wearing Apparel Wood Paper Printing & Publishing Leather Rubber & Plastics Chemicals Non-metallic Minerals Basic Metal Industries (1960's) Metal Products Electrical Machinery Motor Transport	Machinery Basic Metal Industries (1940's)	Furniture Basic Metal Industries (1950's)

Source: Fedderke and Schirmer (2004).

Table 4: Comparison of Average Percentage changes in Labour Productivity and Real Labour Cost in the Three Aggregate Mining Sectors of South Africa.

Sector:	Avg % Change in:	1970-75	1975-80	1980-85	1985-90	1990-95	1995-97
Coal	Labour Productivity	3.19	7.95	11.27	-1.39	4.02	5.96
	Real Cost of Labour	3.98	-2.46	21.02	3.57	-0.94	10.91
Gold& Uranium	Labour Productivity	-4.47	-4.61	-4.31	-1.22	6.09	-1.28
	Real Cost of Labour	-8.55	-9.30	6.81	9.31	10.03	-0.59
Diamond & Other	Labour Productivity	2.40	0.58	5.64	1.19	5.11	8.58
	Real Cost of Labour	6.61	-4.88	14.70	3.98	2.17	15.58

Source: Fedderke & Pirouz 2002.

Table 5: Testing for Spill-Over Effects

Dependent Variable: Growth in Total Factor Productivity			
Regressors	**Spill-Over Effects**	**Regressors**	**Schumpeterian Effects**
$\frac{\dot{K}}{K}$	-0.004*	**R&D**	0.02*
	(.000)		(.01)
WENROL	-0.03	**WENROL**	-0.67*
	(0.34)		(0.30)
TOTENROL	-0.12*	**TOTENROL**	-0.09
	(0.04)		(0.05)
MATHPRP	0.11*	**MATHPRP**	0.02
	(0.04)		(0.04)
DEGREE	$-0.1 \times 10^{-4*}$	**DEGREE**	-0.1×10^{-5}
	(0.1×10^{-5})		(0.1×10^{-5})
NESDEG	0.00	**NESDEG**	-0.1×10^{-5}
	(0.00)		(0.1×10^{-5})
NESDEGPRP	0.79*	**NESDEGPRP**	1.00*
	(0.32)		(0.39)
APPCAP	13.82	**APPCAP**	-50.75*
	(15.13)		(19.52)
LnPATENT	0.01*	**LnPATENT**	0.02*
	(0.004)		(0.00)

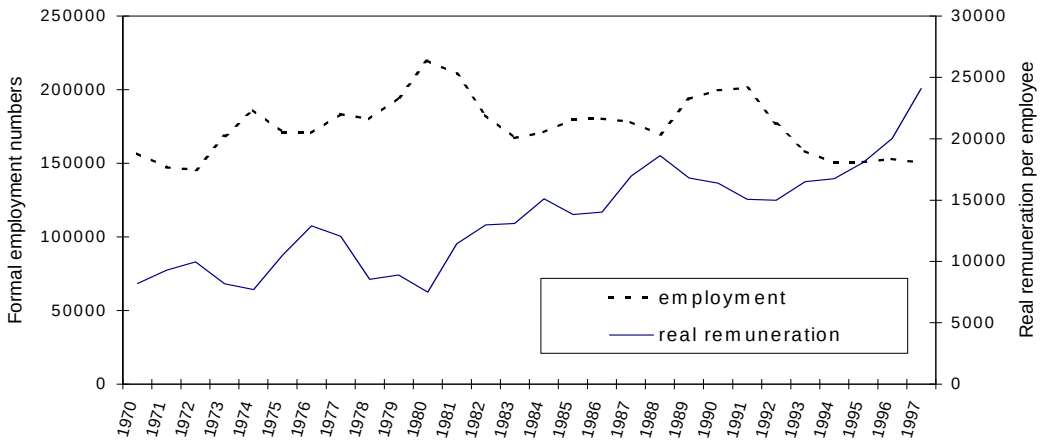
Figures in round parentheses denote standard errors, * denotes statistical significance at the 5% level.

WENROL denotes the primary and secondary school enrolment rate for “whites”, TOTENROL the primary and secondary school enrolment rate for all population groups, MATHPRP the proportion of matriculants sitting mathematics, DEGREE the total number of degrees issued by universities, NESDEG the number of degrees issued in the natural, engineering and mathematical sciences (NES), NESDEGPRP the proportion of NES degrees issued, APPCAP the per capita apprenticeship contracts issued, PATENT the number of patents registered, and R&D denotes an indicator of research and development expenditure.

Table 6: Per Capita Publication Unit Output by University, 1989-94.

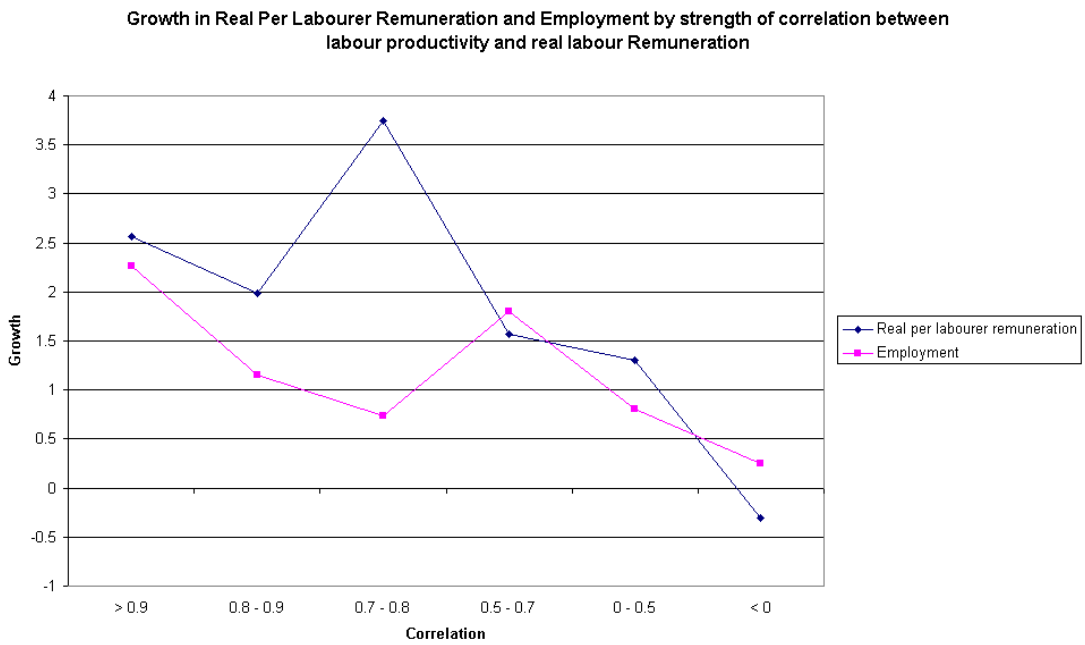
	1989	1990	1991	1992	1993	1994	Rank1989	Rank1994
Wits	1.17	1.09	0.78	0.83	0.74	0.84	1	3
Cape Town	1.04	0.98	0.93	0.93	0.89	0.91	2	1
RAU	0.92	0.82	0.71	1.03	1.00	0.89	3	2
Natal	0.68	0.59	0.58	0.49	0.65	0.56	4	5
Rhodes	0.59	0.56	0.49	0.47	0.43	0.47	5	6
Stellenbosch	0.55	0.49	0.45	0.51	0.50	0.65	6	4
Pretoria	0.51	0.50	0.43	0.47	0.48	0.45	7	7
Free State	0.41	0.43	0.41	0.37	0.40	0.39	8	8
Potch	0.40	0.45	0.35	0.41	0.36	0.36	9	9
UPE	0.38	0.29	0.34	0.33	0.22	0.28	10	10
Medunsa	0.26	0.14	0.23	0.07	0.16	0.12	11	15
UNISA	0.24	0.25	0.24	0.25	0.23	0.25	12	11
UDW	0.20	0.19	0.21	0.22	0.18	0.24	13	12
Vista	0.15	0.10	0.11	0.11	0.09	0.09	14	17
UWC	0.14	0.09	0.11	0.13	0.20	0.22	15	13
Zululand	0.14	0.08	0.12	0.14	0.12	0.16	16	14
North	0.10	0.11	0.08	0.08	0.11	0.10	17	16

Figure 10: Diamond & Other Mining: Employment and Real Cost of Labour.



Source: Fedderke and Pirouz (2002).

Figure 11: Exploring the link between wage increases moderated to the rate of productivity increase, and employment growth



Source: Fedderke and Mariotti (2002)

APPENDIX

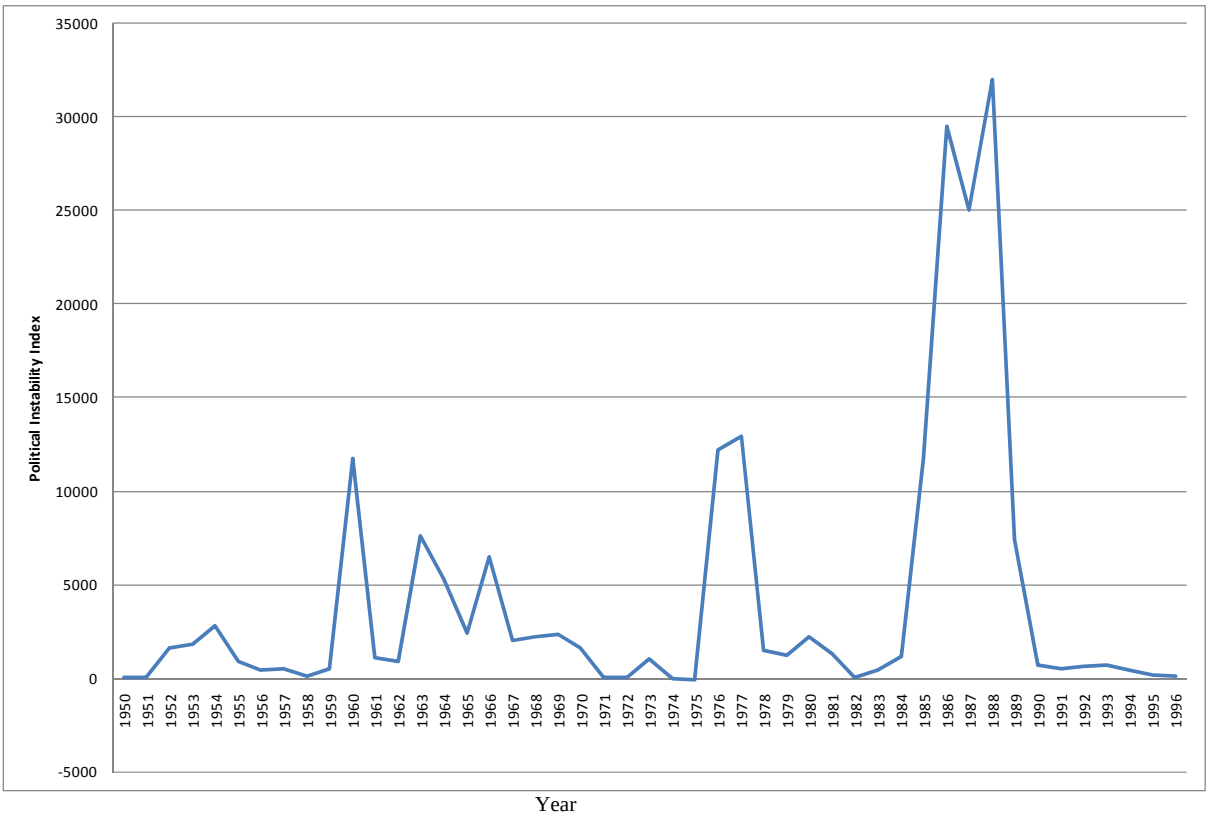
The Systemic Uncertainty or Political Instability Index

A measure of systemic uncertainty is provided by an index of political instability obtained from Fedderke, De Kadt and Luiz (2001). It is illustrated in Figure 1. Political instability was latent in South Africa throughout the twentieth century, and became overt often after 1948. The index is a weighted average of eleven indicators of repressive state responses to pressures for political reform. They are constructed from official and unofficial sources,

The indicators are:

- 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 1950;
- the number of people placed in detention;
- the number of political fatalities;
- the number of organizations officially banned;
- the number of actions against "riots";
- declarations of official states of emergency;
- the number of publications subjected to censorship.

Weightings were determined by the Delphi technique on the basis of advice from leading political scientists in South Africa.[6]

[6] See the detailed discussion in Fedderke, De Kadt and Luiz (2001).

Political Instability