

Trade, growth and distribution in the South African economy

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This article examines the impact of changes in the volume and structure of trade on major macroeconomic variables, including growth in GDP, inflation, interest rates and the distribution of income. Five-year projections are made using a nine-sector, dynamic, computable general equilibrium (CGE) model. Two simulations are considered, one in which growth in the mining sector is autonomously increased by 1 per cent and a second in which the nominal exchange rate is devalued by 3 per cent. CGE evidence supports the conclusion that an export-oriented growth strategy which does not promote traditional exports will fail. Collaborative macroeconomic policies are also necessary to ease the balance of payments constraint, but must be combined with more direct intervention in order to avoid significant deterioration in the distribution of income.

1. INTRODUCTION

This article surveys the effect of the foreign sector on the major macroeconomic variables of the economy – growth, inflation, employment and income distribution – by way of a dynamic, multi-sectoral, computable general equilibrium (CGE) model (Gibson & Van Seventer, 1995a). Two simulations are considered, one in which the growth of the mining sector is increased and the other in which the rate of currency devaluation is accelerated. In both simulations, the economy becomes more outwardly oriented, but the first brings faster growth in output and employment. The general conclusion is that an export-oriented growth strategy that ignores the traditional export base of the South African economy will probably not be very successful. Devaluation is also an essential tool in closing the foreign exchange gap, and for that reason should be used in conjunction with other export-friendly macropolicies. The CGE evidence presented here suggests that direct support of the sectors that produce primary goods is necessary to avoid deterioration of the real wage and an inflationary backlash on the part of workers in the formal sector.

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The following section of the article is devoted to a review of the stylised facts essential to the modelling exercise. Section 3 presents an analytical model by means of which the results of the simulations can be studied and interpreted. The simulation results are discussed in Section 4, and Section 5 presents some conclusions.

2. SOME STYLISTED FACTS

Growth in South Africa is heavily dependent on imported capital and intermediate goods, and is therefore indirectly dependent on exports (IDC, 1995). At present, it is difficult to argue that South Africa is constrained by foreign exchange, that it could grow more rapidly only if imports could be increased. It is widely accepted, however, that more rapid growth would soon encounter a foreign exchange constraint, with output and employment limited by the performance of the external sector. South Africa's ratio of foreign debt to GDP has risen marginally to 23 per cent as of December 1994. By international standards, the country is still under-borrowed and will remain so until the ratio rises to about a third of GDP. Thus there is some scope for additional growth without increasing exports. The headroom, however, is clearly insufficient to support a medium-term growth strategy. (See Kahn et al, 1992; Fallon & Pereira da Silva, 1994.) With the end of trade sanctions, South Africa could be poised for an export-led boom of some proportion, especially as regional markets reopen.

Export-led growth is not balanced growth, however, and there is concern that a boom in exports could stimulate output, but somehow retard the development process. (See Helleiner, 1992, and also Bell, 1992, who reviews many of the issues of relevance for South Africa discussed in the Helleiner collection.) Neoclassical economists, of course, have assembled a formidable and multifaceted attack on this idea. The theoretical literature strongly suggests that the presence of domestic distortions does not affect the optimality of free trade (Bhagwati & Ramaswami, 1963) and the stunning success of the East Asian countries in achieving high growth *with* progressive redistribution is held up as a model to be emulated worldwide. However, even the most shining example, South Korea, is widely acknowledged to have departed from accepted market principles in order to piece together an aggressive programme of industrial promotion as the foundation for a successful trade strategy (Amsden, 1989; Wade, 1990). This reality is increasingly accepted by policy-makers throughout the world, and whatever success South Africa will have in stimulating exports will result, in part, from policies designed for that specific purpose. Coordinated policies, both microeconomic and macroeconomic, will be required to ensure that a more open orientation does indeed promote growth and that the benefits of the growth are not appropriated by a fortunate few. If trade policy leads to higher unemployment or increasing inequality, it will not be judged successful despite the efficiency gains of increased specialisation. Holden and Holden (1981) have shown that export promotion will absorb more labour than an import substitution policy, although this claim has been disputed by Van Seventer (1989).

Trade policy since the Second World War was largely protectionist. The engine of growth was import substitution industrialisation, and South

Africa quickly progressed from consumer goods to intermediates and eventually to capital goods. During the 1970s, the emphasis tentatively shifted towards the promotion of exports, although import substitution continued with the isolation of the 1980s (Holden & Holden, 1981). The fact that its exports are based on natural resources has always made South Africa vulnerable to 'Dutch Disease' overvaluation of the rand, although export promotion received an unintentional boost as a result of a politically driven, real devaluation of the exchange rate in the mid-1980s. Sanctions during the latter half of the decade undermined export promotion (Holden, 1988: 22), and the surplus on the current account, required for debt service, was achieved by restricting imports.

With the end of apartheid, trade policies have increasingly focused on trade liberalisation. Trade reform was engineered by the Industrial Development Corporation (IDC), which in 1990 recommended the simplification and gradual reduction of tariff barriers, the elimination of import surcharges and the phasing out of the General Export Incentive Scheme. In late 1993, South Africa's offer to the GATT was accepted and in 1995 the import surcharges were scrapped. Trade liberalisation is proceeding, but there has been little effort to integrate trade and industrial policy (Industrial Strategy Project, 1995: 50-2). There is almost no discussion of how the State might promote traditional exports and, for the moment, the policy debate centres on the promotion of manufactured or non-primary exports. As noted by the International Monetary Fund (1995: 27), '... the perception that the past inward-oriented trade policy has been inimical to growth, has resulted in the authorities' acceptance of the notion that growth - and in particular growth in employment - *will require trade in manufactures and services* and an outward-oriented trading regime' (emphasis added). The strategy is to support small and medium-sized exporters through finance and the duty drawback and rebate scheme.

There are two main obstacles to achieving these goals. First, this policy direction amounts to reversing the historical trade pattern which has characterised South Africa in the post-war period. Primary products (agriculture and mining, including gold, platinum, diamonds, coal and other minerals) still account for some 50 per cent of total exports, of which about half is made up by gold. Trade in manufactures has never been the driving force of the South African economy, but some progress has been made recently by way of large investments in upstream, capital-intensive sectors such as basic metals and chemicals. Together these accounted for two thirds of manufacturing exports in 1985 and a fifth of total exports. Growth of non-traditional exports has certainly been impressive. Between 1972 and 1983, exports of manufactures grew by 3,6 per cent per annum and then accelerated to an average annual growth rate of 12,9 per cent between 1985 and 1994 (South African Reserve Bank, 1995: S-126; Fallon & Pereira da Silva, 1994: 76). In 1987, real merchandise exports were 12,9 per cent of GDP, but by 1994 they had risen to 18,2 per cent (South African Reserve Bank, 1995: S-126). The fastest growing sectors, such as furniture, wood products, glass and beverages, are still small in comparison to basic metals, chemicals, textiles and apparel, and equipment, which have accounted for approximately two thirds of the growth in manufactured exports (Fallon & Pereira da Silva, 1994: 76).

The second obstacle is that in order for trade reform to produce equitable growth, a coherent set of macroeconomic policies must be in place. Policies must be coherent in the sense that the effects of trade liberalisation are not crowded out by other policies. Moreover, the regressive distributive effects must be contained and moderated so that no significant opposition to liberalisation develops which would block the benefits of the programme. So far, little attention has been paid to the integration of macro and micro trade policies. The recent rapid growth in manufactured exports is more likely the by-product of depressed domestic demand and lagging capacity utilisation. In the sectors in which capacity utilisation declined most severely, including beverages, other non-metals, electrical machinery and other transportation equipment, export growth was the fastest. Fallon and Pereira da Silva (1994) estimate the elasticity of manufactured export volume to capacity utilisation at 2.4, suggesting that South African exports are largely a residual after domestic demand has been satisfied. This pattern is common among import substitution industrialisation countries and had earlier been noted for South Africa by Holden (1988: 16). The pattern is disturbing, since it means that a reduction in any anti-export bias in the real effective exchange rate will not necessarily improve export performance if capacity utilisation is high. Moreover, the normal response to higher utilisation rates is to invest and expand capacity. If exports are themselves responsible for a high rate of capacity utilisation, the increase in investment may not be forthcoming.

The structure of the economy shows that the primary and non-primary sectors are interlaced in an asymmetrical way. Backward linkages from mining sectors to the rest of the economy exist, but are relatively weak. The social accounting matrix for South Africa shows that only a fifth of intermediates in mining are imported and almost a third are delivered from domestic manufacturing. However, when viewed from the perspective of direct and indirect linkages to the rest of the economy, mining linkages are much weaker. For example, the indirect pull of manufacturing and construction on the rest of the economy is more than three times that of mining. Neither are the forward linkages well established, in that it seems difficult to argue that downstream industries are constrained by the availability of raw materials. Of course, an expanded conception of forward linkages would capture the effect of increased mining employment on consumption demand in the rest of the economy, but low wages for variable labour in the mining industry diminish the impact. Non-primary sectors, on the other hand, depend on mining output, especially coal. The South African social accounting matrix shows that more than 87 per cent of the gross value of production of mining is exported (virtually 100 per cent of gold); another 11.7 per cent is used as intermediates, while the remainder is consumed by households. While the intermediate use of mining output is still relatively low when measured in direct terms, the sector earns most of the foreign exchange with which imported intermediates are purchased.

In the following section, we study a small, two-sector, static macromodel designed to reflect the structural rigidities just outlined (for a similar modelling strategy, see Taylor, 1983). The model features a primary sector which operates at full capacity and exports what is not consumed, either directly or as intermediates by firms in the non-primary sector. The

primary price is given in the world market and profits depend on wages and output. In the non-primary sector, output is determined by demand, with price as a mark-up on wage costs. Export demand depends on the real exchange rate. Policies which promote primary exports must help generate more supply, while those oriented towards non-primary exports must increase demand. The principal tools available to the government are direct support for research, development and exploration in the primary sector and increasing the competitiveness of the non-primary sector through devaluation. In the empirical model, the government is counterfactually assumed to adopt a more aggressive growth strategy than that currently planned by the Government of National Unity. In particular, government spending rises slightly to reflect the increased support for the mining sector.

3. A MODEL

As noted above, the model used for the simulations presented in this article is sufficiently complex that it is best studied by way of a small prototype that shares many of its characteristics. However, a number of assumptions that are made to simplify the presentation of the model's structure do not carry over to the complete model. Most importantly, we concentrate on the comparative statics of the small model, whereas the empirical model is fully dynamic. (For complete details of the model specification see Gibson & Van Seventer, 1995a.)

Let there be two sectors in the prototype economy: one produces primary goods for export and domestic consumption, and the other produces domestic consumption and investment goods as well as exports. Demand for the primary goods consists of worker consumption demand, intermediate demand by the non-primary sector, and exports. Equation (1) summarises the supply and demand balance in the primary goods sector.

$$(1) \quad e p_1^* x_1 = m w (l_1 x_1 + l_2 x_2) + e p_1^* (a x_2 + E_1)$$

where e is the nominal exchange rate, p_1^* is the world price of primary exports and x is the level of real output. The demand is made up of a fraction, m , of worker income which is just the product of the wage, w , and employment. The latter is the sum of the product of the labour coefficients, l , and output. Intermediate demand is given by an input-output coefficient, a , multiplied by the level of output in the non-primary sector. Primary exports are denoted by E_1 .

The non-primary material balance is:

$$(2) \quad p_2 x_2 = (1-m) w (l_1 x_1 + l_2 x_2) + (1-s) (\pi_1 x_1 + \pi_2 x_2) + p_2 A + e p_2^* E_2$$

where s is the savings propensity out of profits πx and A is autonomous expenditure, including both current government expenditure and investment. Note that there are no taxes, despite the possibility of government expenditure. The profit coefficients can be defined as:

$$(3) \quad \pi_1 = e p_1^* - w l_1$$

where for expositional purposes we assume no intermediates, either domestic or imported. For the non-primary sector, the profit coefficient is defined as:

$$(4) \quad \pi_2 = p_2 - e (p_0 a_0 + p_1^* a) - w l_2$$

where p_0 is the price of imported intermediates and a_0 is the imported intermediate input-output coefficient. The price in the non-primary goods sector is just a mark-up on costs:

$$(5) \quad p_2 = (1+\tau)[e (p_0 a_0 + p_1^* a) + w l_2]$$

so that π_2 can also be expressed as:

$$\pi_2 = \tau[e (p_0 a_0 + p_1^* a) + w l_2] = \tau p_2 / (1+\tau)$$

With x_1 given in the short run, the primary goods sector is export clearing in the sense that once domestic demand is determined, the remainder is then exported. In the non-primary sector, however, exports are taken to be a given fraction, ϵ , of total production:

$$(6) \quad E_2 = \epsilon (e p_2^* / p_2) x_2 \quad \epsilon' > 0$$

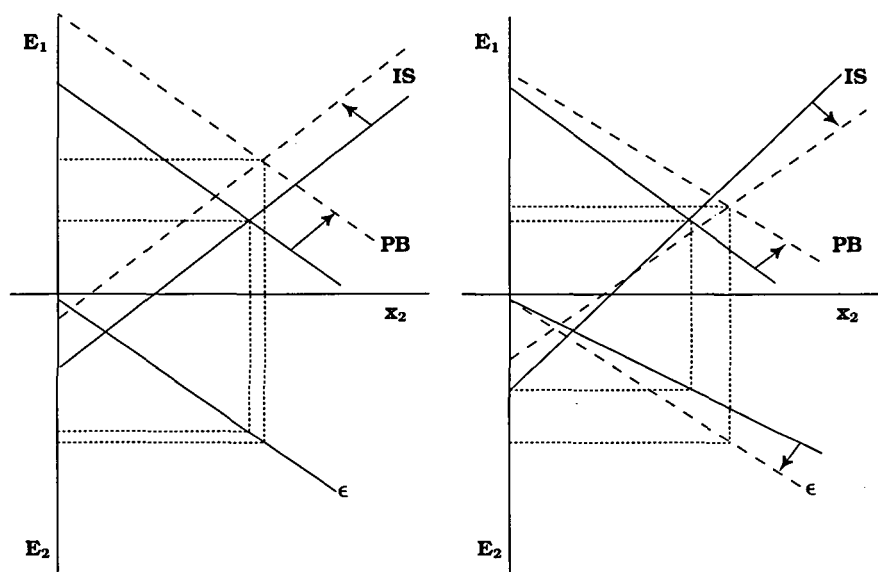
The coefficient, ϵ , depends on the real exchange rate, itself a function of the nominal exchange rate and the world price, p_2^* , of non-primary output. Substituting equations (3) to (6) into (1) and (2), we can write the savings-investment balance in the economy as:

$$(7) \quad e (p_0 a_0 x_2 - p_1^* E_1 - p_2^* \epsilon x_2) + s [(e p_1^* - w l_1) x_1 + \tau p_2 x_2 / (1+\tau)] = p_2 A$$

where the first term on the left is foreign savings and the second is gross private savings. On the right is autonomous expenditure, which consists of investment plus government. Equations (1), (5), (6) and (7) now constitute four equations in the variables E_1 , p_2 , E_2 , and x_2 . The crucial assumption is that the level of primary output, x_1 , is given by capacity, which is itself determined by the stream of previous investment, with all other symbols taken as given parameters.

Figure 1 shows the solution to the model and will be used to explain the key results of the larger model. The output of the non-primary sector is plotted on the horizontal axis, while primary exports are on the vertical. Non-primary exports are shown in the fourth quadrant, increasing in the southerly direction. The downward sloping curve in the first quadrant is the primary balance and is labelled PB. Its slope, obtained by implicitly differentiating equation (1), is:

Figure 1: The impact of an increase in capacity growth in mining (left) and devaluation (right)



$$(8) \quad dE_1 / dx_2 = - (mw l_2 / ep_1^* + a)$$

and derives from the fact that as non-primary output increases, domestic demand for the primary good (both intermediate and final) increases, leaving less available for exports.

The upward sloping curve is the savings-investment balance, or IS curve. Its slope is given by implicit differentiation of equation (7):

$$(9) \quad dE_1 / dx_2 = (p_0 a_0 - p_2^* \epsilon) / p_1^* + s \tau p_2 / [(1 + \tau) e p_1^*]$$

Note that if foreign savings is positive, the first term on the right must also be. As non-primary output rises, imports increase. For the same level of autonomous expenditure, the rise in domestic savings (linked to profits which are increasing with output) must be compensated by a fall in foreign savings; that is, an increase in exports (from both sectors) that exceeds the rise in imports. A rise in x_2 is thus associated with an increase in E_1 and the IS curve must be upward sloping.

The intersection of the two curves gives the goods market equilibrium. With the level of primary output given, the equilibrium determines both the level of primary exports and the capacity utilisation in the non-primary sector. With the latter known, non-primary exports are determined by the real exchange rate, or the slope of the ϵ locus in the fourth quadrant. A rise in the domestic price p_2 , would cause an appreciation of the real exchange rate and a fall in the level of non-primary exports for the same x_2 .

We now turn to some comparative statics as a way of introducing the main results of the article. Consider first an autonomous increase in the output of the primary goods sector, that is, an increase in x_1 . This may be brought about by government intervention that stimulates exploration or adoption of the best practice. A rise in primary output has no effect on equation (5) and therefore does not change p_2 ; consequently, it can have no impact on the share of output exported by the non-primary sector, ϵ , since the real exchange rate is thereby fixed. Neither can x_1 have any effect on the slopes of the PB or the IS loci as shown by equations (8) and (9).

However, as shown in the first panel of Figure 1, both intercepts are shifted upward, and the level of primary exports and non-primary output is increased. (The proof of this proposition depends on the assumed adjustment mechanism. Under reasonable assumptions about how the sectors adjust from disequilibrium, it can be shown unequivocally that both exports and economic activity rise. This proof is available from the authors upon request.) The growth in capacity of the primary goods sector increases its ability to export, and earnings (profits and wages) cause the demand for non-primary sector output to increase. Intermediate demand for the primary good will rise in turn and attenuate the growth in primary exports. The drop in exports will be counterbalanced somewhat by the growth in non-primary exports. This is shown in the fourth quadrant of the first panel of Figure 1, where it is seen that the slope of the ϵ locus does not change with an increase in primary output. Note that constant prices imply that real wages remain fixed. The net effect of the stimulus to the primary sector is that employment in both sectors, primary and non-primary, increases without a fall in the real wage.

It is significantly more complicated to assess the effect of a nominal devaluation in the model. First, it is clear from equation (5) that if the exchange rate increases, *the price level must rise and real wages in terms of the second good must decline*. Non-primary exports, for any level of output, must nevertheless rise, since the devaluation will not result in a proportional rise in p_2 ; in other words, some real devaluation results from the rise in the nominal rate. With real depreciation, the ϵ locus in the fourth quadrant rotates in a clockwise direction.

Devaluation causes the slope of the PB locus to increase (become less negative), while the intercept also rises – see equations (8) and (1). The slope of the IS curve falls, but the intercept increases – see equations (9) and (7). Thus, the IS locus rotates in a clockwise direction. In the second panel of the figure, the solution shows an increase in E_1 and E_2 . The result can be explained as follows: devaluation has caused a decrease in

the real wage and therefore exports of primary goods increase with falling domestic demand. In the non-primary sector, lower wages increase profits and non-labour consumption. The devaluation also increases the *real value* of exports in that sector. The nett effect is to increase output.

Since Diaz-Alejandro (1963), Cooper (1971), and Krugman and Taylor (1978), *contractionary* effects of devaluation have been suspect, and although the figure shows an expansion in total output, it is not possible to prove unequivocally that devaluation is expansionary in this model. Devaluation causes expenditure shifting away from the primary and towards the non-primary good. *Were there no change in income*, this would cause a rise in employment in the model to accompany the fall in the real wage. Note that if the consumption of primary goods by workers is small, the decline in real wages brought about by the rise in the non-primary price could lead to a contraction in total output. To see this, assume that there is no *direct or indirect* consumption of primary goods by workers; hence, there can be no expenditure switching and primary exports remain fixed. On the other hand, the contribution to aggregate savings by the primary sector increases as real wages fall with the devaluation. With real investment fixed, total real savings must also be constant, but this cannot be unless the sum of the non-primary and foreign contributions to savings falls to offset the increase in primary savings. Note, however, from equation (7), that the sum of the non-primary and foreign contributions to total savings must move in the same direction as non-primary output. Thus, non-primary output would have to contract to satisfy the aggregate savings-investment balance. On the other hand, if primary exports do indeed rise owing to expenditure switching, non-primary output could rise, since foreign savings would decrease with the rise in exports.

Of course, the analysis of contractionary devaluation assumes that an increase in primary exports can only come about through expenditure switching. However, if the rise in primary sector profitability causes investment and output to increase, foreign savings will decline, allowing the level of economic activity to recover along the familiar 'J' curve. A second complication concerns investment: a lowering of the real wage can either increase investment through a rise in profitability, or dampen it as markets shrink from the lack of demand. If the latter occurs, contractionary devaluation is evidently much more likely.

3.1 Macropolicy connections

Fiscal policy in South Africa is constrained by an effective agreement to limit the public sector borrowing requirement (PSBR) to a targeted fraction of GDP. The implications of this approach for policy are far-reaching and are examined in detail in Gibson and Van Seventer (1996). If the PSBR to GDP constraint is binding (as it is in the empirical model studied below), any rise in tax revenues will cause government investment to rise and vice versa. Moreover, if, as has been argued by Makgetla (1995), public sector revenues are closely tied to mining performance, policy which stimulates that sector can have a very different macroeconomic impact compared to policy which is intended to raise non-primary output and exports.

Government investment rises with government savings and there is no impact on the other components of the savings-investment balance. The proceeds from the devaluation are shared by the State and then spent, but economic activity and the savings that it generates remain the same. However, if the PSBR constraint is *not* binding, the analysis is very different. A rise in mining revenues will cause government savings – not seen in equation (7) – to rise and thus the tendency towards contractionary devaluation will be exacerbated. In the empirical model employed below, the PSBR constraint is effective and thus the tendency towards contractionary devaluation is ameliorated.

We conclude that devaluation can cause non-primary output to go either way, depending essentially on whether exports rise. In the present model, export growth largely depends on the forward linkage between the non-primary and primary sectors. Since the South African economy, as noted above, is characterised by rather weak domestic demand for primary goods, it is more likely that devaluation will indeed cause the aggregate level of economic activity to contract. This question needs to be explored further through simulations using actual data.

4. SIMULATING THE EFFECT OF EXPORTS ON THE ECONOMY

This section is devoted to an empirical analysis of how a rise in exports affects the macroeconomy. Two simulations are considered – one in which the growth of primary exports is increased exogenously and another in which nominal devaluation depreciates the real exchange rate. Both elements could be combined in a coherent strategy to raise exports, but they are introduced separately in order to analyse their effects more clearly.

As should be clear from the discussion above, the empirical model is dynamic rather than static and thus a number of effects, which can easily be separated in the prototype, converge. In designing the simulations, trajectories had to be fixed for each of the exogenous parameters of the model; in some cases, parameters of the small model were endogenised in a way that allowed for smooth changes over time. The end result is a model which differs from the prototype in some very important ways, but nonetheless reproduces many of its basic features. A second important characteristic of the presentation of the results is that they are expressed in deviations from a 'base run'. The base run assumes a moderate degree of government involvement in the design and implementation of a successful 'growth strategy' (Gibson & Van Seventer, 1996). Growth reaches close to 4 per cent per annum and inflation is around 15 per cent. The growth strategy allows for essentially constant real wages and is distributively neutral. (Full details of how the model was specified and how the base run was constructed are available upon request from the authors.)

The model includes nine sectors: agriculture; mining; food and furniture (these two sectors are collectively regarded as wage goods); manufacturing; electrical machinery; construction; trade and (non-financial) services; and finance. There are two classes of labour, skilled and unskilled, and the bottom 80 per cent of households are classified as low-income while the top 20 per cent are classified as high-income. The PSBR to GDP ratio is set exogenously to 6 per cent of ex post GDP. The government finances

this debt by sales of bonds to the public sector (the Public Insurance Commission and the South African Reserve Bank), the public and foreigners. All interest rates and asset prices are determined endogenously. Capital and labour productivities change endogenously and wages adjust, all according to the level of capacity utilisation. The adjustment mechanisms of the model are similar to the prototype discussed above, with agriculture and mining as the primary sectors and the rest as non-primary. The model was calibrated to the period 1990–4 and then run for five years forward.

4.1 Increasing mining exports

The rate of growth in mining capacity was increased by 1 per cent over the base run, so that for the same level of investment, capacity would increase by 1 per cent faster. It must be stressed that this change is not entirely exogenous and may be thought of as resulting from a change in domestic policy. It may, for example, be the result of reprioritising government expenditure towards research, development and exploration in the primary sector; the loss in productivity caused by the reprioritisation is not accounted for in the model. In South Africa, there is an historically close relationship between the State and the mining sector, especially gold and coal (Freund, 1991; Leger, 1991). Since the late 1980s, policy has evolved in a more market-oriented direction. The premise of this simulation is that either the new policies begin to work, or they are reversed. In either case, capital productivity increases as a result of a successful export-led growth strategy which focuses on the primary sector.

Table 1: Change in physical exports with a 1 per cent increase in mining capacity growth¹

	Total exports	Primary	Non- primary	Mining	Exports Food	Manu- facturing	Machinery	Trade	Real exchange rate
1995	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1996	100,5	100,9	100,0	101,1	100,0	100,0	100,0	100,0	100,0
1997	101,0	101,7	100,1	102,1	100,0	100,1	100,2	100,2	100,0
1998	101,6	102,6	100,3	103,2	100,2	100,2	100,6	100,4	100,0
1999	102,1	103,5	100,5	104,3	100,4	100,5	101,1	100,7	100,0
<i>Period averages</i>									
1995–9	101,1	101,7	100,2	102,1	100,1	100,2	100,4	100,2	100,0

Source: Model computations.

Note: 1. Ratios to the base run.

Table 1 shows that an increase in mining capacity growth of 1 per cent per year gives rise to an average increase in total exports of 1,1 per cent higher than in the base run. This result is owing to an increase in primary exports of 1,7 per cent and a much smaller rise in non-primary exports. Mining increases its physical exports by more than 2 per cent on average, while the other sectors show incremental increases. Observe in the last column that while there is some real devaluation in the baseline scenario, no additional devaluation was imposed.

These results reproduce those of the pilot model studied above. An increase in primary output stimulates demand for the non-primary sector, just as the first panel of Figure 1 shows. This causes capacity utilisation to rise there. The dynamic response, not captured in the prototype, is an increase in investment and growth across the economy. Exports rise by slightly more than the exogenous shock because of the cumulative effects of growth.

Table 2: The macroeconomic impact of a 1 per cent increase in mining capacity growth

	Real imports ¹	Foreign savings ¹	Capital utilisation ¹	GDP ¹	Inflation rate ²	Interest rate ²	Investment ¹	Real wage ¹	Nett foreign assets ¹
1995	100,0	100,0	100,0	100,0	0,0	0,0	100,0	100,0	100,0
1996	100,3	88,8	100,3	100,4	0,3	0,3	100,4	99,8	95,2
1997	100,8	88,8	100,5	100,8	0,5	0,5	101,0	99,6	98,2
1998	101,3	92,4	100,8	101,3	0,7	0,8	101,7	99,4	100,1
1999	101,9	95,6	101,0	101,8	0,8	0,9	102,5	99,2	101,7
<i>Period averages</i>									
1995-9	100,9	93,1	100,5	100,8	0,5	0,5	101,1	99,6	99,0

Source: Model computations.

Note: 1. Ratios to the base run.

2. Absolute differences.

Table 2 shows how the increase in exports affects the rest of the macroeconomy. Real imports rise with growth, but not sufficiently to cause a rise in foreign savings or the current account deficit (defined as imports, nett interest payments and profit remittances, together with incoming transfers less exports). Foreign savings fall significantly, on average by almost 7 per cent relative to the base run.

The third column of Table 2 confirms that across the economy capacity utilisation rises relative to the base. A 1 per cent increase in mining capacity growth gives rise to just less than 1 per cent higher GDP, on average, as seen in the fourth column. Note that inflation and the interest rate also increase with growth. As a result, real investment is crowded out, but these effects are overcome by the accelerator, and investment rises by more than 1 per cent over the base. In contrast to the simple model, mark-ups rise here with capacity utilisation; thus real wages in terms of all goods fall initially. Over time, however, the real wage increases by 1,1 per cent on average, but as shall be seen below, the increase is not equally distributed. Finally, higher growth gives rise to less capital flight, measured in the last column by nett foreign assets, the difference between gross capital flight and foreign borrowing. However, as the inflation rate rises and wealth increases with growth, capital flight eventually surpasses the base by 1,7 per cent in 1999. In the model, capital flight depends on portfolio balance and normalised rates of return on money, bonds, equity and foreign holdings. Domestic inflation improves the rate of return on foreign assets, and higher growth, income and savings increase the size of portfolios. The nett effect is a rise in foreign assets, as shown in the table.

Table 3: Change in the public sector with a 1 per cent increase in mining capacity growth¹

	Public investment	Taxes	Government savings	Debt	Interest payments ²	Current goods	Wage bill	Money growth	Indirect money
1995	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1996	100.6	100.7	100.4	100.6	100.6	99.7	100.1	99.9	99.6
1997	101.4	101.4	101.1	101.4	101.3	100.5	100.4	100.2	99.9
1998	102.5	102.2	102.1	102.5	102.0	101.9	100.8	100.6	100.3
1999	103.8	103.0	103.2	103.8	102.8	103.5	101.4	101.1	100.8
<i>Period averages</i>									
1995-9	101.7	101.5	101.4	101.7	101.3	101.1	100.5	100.4	100.1

Source: Model computations.

Note: 1. Ratios to the base run.

2. Domestic.

The effect on the fiscal accounts is summarised in Table 3. This table is crucial, since it shows how changes in the private economy reflect back on the level of government intervention. This interaction is entirely endogenous to the model and therefore it is not feasible to examine the effect of mining capacity growth while holding fiscal variables constant. Table 3 thus shows the induced changes in the fiscal structure produced by growth in the mining sector – changes which themselves provoke additional changes in the macroeconomy. These effects were absent in the small model above, but must be included in any realistic account of how the economy actually behaves. Observe that by the end of the simulated period, public investment is almost four percentage points higher than in the base run. This is largely the product of the rise in tax revenues brought on by the inflation. Government savings, shown in the third column, also increase and do so more rapidly than the GDP shown in Table 2.

Debt is somewhat higher owing to the effect of faster growth on interest payments. Current and wage expenditure also rise with higher growth, although they fall as a percentage of GDP since they rise more slowly. Total liquidity, shown in the next to last column, increases but at a rate slower than GDP. Since money is entirely endogenous in the model, this reflects a shift in portfolios away from money and towards bonds, equity and capital flight. The last column shows the absolute change in the ratio of 'indirect monetisation'. In traditional monetary analysis, as reported by the Reserve Bank and elsewhere, the counterpart of M3 is approximately the sum of credit to the private and public sectors plus the reserves. Indirect monetisation occurs when credit to the private sector expands in order to absorb public debentures; in other words, some of the growth in private credit is the direct result of the rise in public sector credit. The results of the simulation show that the demand for money is growing more rapidly than money indirectly created by government finance. As can be seen from Table 2, the demand for money is growing more slowly than GDP and so the velocity is increasing. This is the effect of faster inflation and is a normal response to a rise in the inflation tax. The effect will be even more pronounced in the next simulation when devaluation produces an even faster rate of inflation.

Table 4: Change in employment and wages with a 1 per cent increase in mining capacity growth¹

	Total employ- ment	Primary		Non-primary		Real wages		MFPG ²	Capital: labour ratio
		Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled		
1995	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1996	100,4	100,7	100,9	100,3	100,3	99,8	99,8	119,4	99,8
1997	100,8	101,5	101,8	100,7	100,7	99,5	99,6	115,9	99,7
1998	101,2	102,2	102,7	101,1	101,1	99,2	99,5	119,1	99,5
1999	101,8	103,0	103,7	101,7	101,6	98,9	99,3	117,0	99,3
<i>Period averages</i>									
1995-9	100,8	101,5	101,8	100,8	100,7	99,5	99,6	114,3	99,7

Source: Model computations.

Note: 1. Ratios to the base run.

2. Multifactor productivity growth.

Table 4 shows the effect of an expansion that is led by primary exports on total employment, broken down by primary and non-primary sectors. Observe that the growth in total employment approximately matches that of GDP. The second column shows that the index for employment of unskilled workers in the primary sectors is, on average, 1,5 per cent higher than in the base run. The table suggests a continued dependence of South African workers on the mineral sector. This is not owing to the labour intensity of mining, but rather to the indirect employment that a rise in mining output brings. Both skilled and unskilled labour find their real wage levels reduced in this simulation, but not by much. The nett effect is that real wages decline by less than half a percentage point. This is the cost of additional growth and employment.

Note that growth in output is accompanied by significant improvement in multifactor productivity growth in the model. The increase is the joint product of the exogenously imposed increase in capital productivity and the increase in output and employment owing to the second-order effects of growth. The large percentage change is owing to the small initial values for multifactor productivity growth, which are about 1 to 1,2 per cent. The aggregate capital:labour ratio shown in the last column remains relatively stable, declining somewhat in the last two years.

There is fairly close agreement between the theoretical model presented above and the larger and vastly more complex empirical model. In the small model, an increase in primary capacity caused a rise in total exports and some growth in the non-primary sector. Real wages were constant. There would be a stronger growth in exports if there were not at the same time an increase in intermediate demand for primary output by the non-primary sector. These features have largely been reproduced in the empirical model, with the main conclusion that growth in the primary sector generates employment and has little adverse effect on the real wage.

The more general conclusion is that export-led growth can be balanced growth, as long as public policy can properly identify and deal with the binding constraint on output. If the primary sectors are limited by

capacity, rather than demand, and government intervention is successful in stimulating growth in capacity, an export-led growth strategy can lead to economy-wide growth and higher employment without significant deterioration in the distribution of income. In the next section, we investigate the possibility of an export-led growth strategy that depends on stimulating sectors which are not typically operating at full capacity.

4.2 Devaluation as a means to stimulate non-primary exports

As in the pilot model above, the effect of a nominal devaluation is more complex than an exogenous increase in the output of the primary sector. Table 5 shows the pattern of exports – relative to the base run – that results from a 3 per cent nominal devaluation. Note that since the model does not predict 1994, exports in that year are the same as in the base run. The devaluation has its first effect in 1995, while in the previous simulation the change in the growth in mining capacity was not felt until 1996; hence the difference in the presentation of the tables. The overall impact of the devaluation on total exports is similar to that seen in the first simulation. The export data in Table 5 are given in physical or dollar terms and do not reflect the changed rand value owing to the devaluation. When measured in terms of GDP, primary exports increase much more rapidly because of the shift in the terms of trade brought about by the real devaluation. The most notable effect of the devaluation is the shift in the composition of the export bundle. Primary exports remain approximately constant, while non-primary exports from food, electrical machinery and, principally, manufacturing increase, on average by about 2 to 3 per cent over the forecast period.

Table 5: Change in physical exports with a 3 per cent nominal devaluation¹

	Total exports	Primary	Non- primary	Mining	Exports Food	Manu- facturing	Machinery	Trade	Real exchange rate
1994	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1995	100,4	100,1	100,8	100,0	100,8	100,8	100,8	101,0	100,9
1996	100,7	100,1	101,6	100,0	101,5	101,4	101,5	102,0	101,7
1997	101,0	100,1	102,3	100,0	102,2	102,1	102,2	102,9	102,6
1998	101,3	100,0	103,1	99,9	102,8	102,8	103,1	103,8	103,4
1999	101,6	99,9	103,9	99,8	103,4	103,5	104,0	104,8	104,2
<i>Period averages</i>									
1995-9	101,0	100,0	102,3	99,9	102,1	102,1	102,3	102,9	102,5

Source: Model computations.

Note: 1. Ratios to the base run.

As exports of basic metals and chemicals (both included in the manufacturing sector of the model) increase with the devaluation, there is more demand for mining output as an intermediate product in those sectors. The backward linkages thus reduce the amount available for export and mining exports tend to fall as a result. Evidently, devaluation should not be expected to work in isolation and should probably be accompanied by measures that also promote primary production. Otherwise, there will be a shift in composition, but no significant growth in exports as a whole. Note that the shift from primary to non-primary exports is accompanied by a large increase in trade and non-financial services exports. This is

owing to the larger component of commercial services required to support the exports of non-primary goods. Though small in absolute terms, invisibles (largely trade and transport) increase by the largest percentage change, rising by almost 5 per cent relative to the base by the year 1999.

The last column of Table 5 confirms that the nominal devaluation was successful in bringing about real devaluation. In the first year, a 3 per cent additional nominal devaluation was converted to almost a 1 per cent real devaluation over the base run and the average over the forecast period is 2,5 per cent.

Table 6: The macroeconomic impact of a 3 per cent nominal devaluation

	Real imports ¹	Foreign savings ¹	Capital utilisation ¹	GDP ¹	Inflation rate ²	Interest rate ²	Investment ¹	Real wage ¹	Nett foreign assets ¹
1994	100,0	100,0	100,0	100,0	0,0	0,0	100,0	100,0	100,0
1995	99,8	80,6	100,0	99,9	0,4	0,5	99,9	99,6	154,3
1996	99,8	42,3	100,0	99,9	0,8	0,9	100,1	99,1	87,9
1997	99,8	56,2	100,2	99,9	1,3	1,4	100,6	98,6	93,3
1998	99,9	68,5	100,4	100,0	1,6	1,8	101,3	98,0	96,8
1999	100,1	77,2	100,6	100,1	1,9	2,1	102,1	97,4	99,1
Period averages									
1995-9	99,9	65,0	100,2	99,9	1,2	1,3	100,8	98,6	106,3

Source: Model computations.

Note: 1. Ratios to the base run.

2. Absolute differences.

Table 6 provides some detail on the impact of the devaluation on the rest of the macroeconomy. Imports are hardly affected by devaluation. As shown in the table, imports actually increase incrementally from 1997 to 1999 owing to a shift in composition towards sectors that use imports. With imports relatively constant and exports increasing, the second column of Table 6 demonstrates that the use of foreign savings falls significantly with devaluation; the period average is only 65 per cent of the base run. The relatively large percentage changes in this column are due to the low level of foreign savings – between 0,8 and 2,3 per cent of GDP.

Since foreign savings is just the current account deficit, devaluation will compensate for any slowing down in the inflow of foreign capital or, alternatively, cause an increase in foreign reserve holdings. Table 6 confirms that devaluation helps to postpone any binding foreign exchange constraint. Gibson and Van Seventer (1996) identify devaluation as a necessary component of their growth strategy. Devaluation is necessary there to avoid the dampening effect on growth caused by a balance of payments crisis, either directly or through a perceived need by the Reserve Bank to tighten credit.

The third and fourth columns provide some evidence on the question of whether devaluation tends to be expansionary or contractionary in the empirical model. Note that, on average, GDP falls slightly relative to the base, which suggests that the forces unleashed by devaluation are roughly in balance. In the prototype model discussed above, the output and

employment effects of devaluation depend significantly on whether there is expenditure switching and a consequent increase in exports. Since the model reflects the structural features of the South African economy, it was anticipated that expenditure switching would not play a major role and it evidently has not. As seen in Table 5, primary exports are approximately the same as in the base run. Non-primary exports did increase, however, owing to the dynamic effects of lower real wages (see below) on profitability and investment. The devaluation also has some effect on production switching; that is, producing more for the foreign and less for the domestic market.

Table 6 confirms that foreign savings fall and, moreover, that investment rises relative to the base run. Nonetheless, the contractionary effect of the fall in real wages, and thus a rise in profitability and savings per unit of output, is apparently strong enough to counterbalance the fall in foreign savings and increase in investment spending. Growth in investment is also attenuated somewhat by the crowding out that occurs through the interest rate. The increase in the interest rate parallels the rise in inflation such that, on balance, the real interest rate increases only slightly. Note that the PSBR constraint is binding here and that there is no additional *direct* stimulus on aggregate activity from the fiscus. Public sector investment (see below) increases, however, and this is responsible for the rise in private sector investment reported in the table. Following the theoretical discussion above, public sector savings rise by an amount that just offsets the increase in public investment.

This model confirms that in a structural setting such as South Africa, the expansionary effect of exports can easily be offset by a variety of other macroeconomic phenomena, especially when imports tend to be income rather than price elastic. Policy-makers cannot expect devaluation to produce an increase in the growth of GDP and employment, even when there is sufficient time for 'J' curve effects to play themselves out. The one caveat that must be added to this conclusion is that no rebound effect of higher profits on primary sector growth has been permitted. This may or may not occur, depending on the technological conditions facing the mining sector. We conclude that whether devaluation ultimately contributes to growth depends on how the resulting profits in the primary sector are spent.

Finally, note that nett foreign assets, defined as the capital flight less foreign borrowing, increases because the inflation makes foreign assets more attractive. The large jump from 1994 to 1995 is due to the relatively small absolute values. Data not shown indicate that the devaluation causes nett foreign assets to increase from 2,1 to 3,2 per cent of GDP. This puts some additional pressure on reserves and forces the interest rate up, contributing to the reduction in private sector investment.

Table 7 provides some detail on the effect of a devaluation-led export drive on the public sector. The first column shows that public sector investment as a share of GDP rises with the outward orientation of the non-primary sectors. By 1999, public investment is 6,2 per cent higher than in the base run. The result is due to higher taxes brought on by faster inflation, coupled with an expenditure pattern that is little changed from the base. The

Table 7: Change in the public sector with a 3 per cent nominal devaluation¹

	Public invest- ment	Taxes	Govern- ment savings	Debt	Interest payments ²	Current goods	Wage bill	Money growth	Indirect money
1994	100,0	100,0	100,0	100,0		100,0	100,0		100,0
1995	100,4	99,9	100,0	100,3	101,0	101,4	100,1	100,6	98,4
1996	101,3	100,0	100,3	101,0	102,1	104,0	100,3	99,3	99,7
1997	102,6	100,3	100,9	102,1	103,2	107,4	100,6	99,5	100,2
1998	104,2	100,7	101,9	103,6	104,4	110,1	101,2	100,0	100,8
1999	106,2	101,1	103,3	105,4	105,8	112,8	102,1	100,5	101,7
<i>Period averages</i>									
1995-9	102,9	100,4	101,3	102,5	103,3	107,1	100,9	100,0	100,2

Source: Model computations.

Note: 1. Ratios to the base run..

2. Domestic.

nett effect is that government savings rise by 1,3 per cent over the base on average. The constant share of the PSBR causes debt to increase, as shown in the fourth column. The rise in the relative valuation of imports causes government expenditure on current goods to move up and the wage bill increases because of the effect of inflation on wage negotiations. The three components of government spending – interest, current goods and wages – all increase as a share of GDP. Money growth and indirect monetisation are not significantly different from the base.

It is clear from the foregoing that there has been some decline in the real wage due to the devaluation and it is now our task to determine if the reduction has brought about an increase in employment. Table 8 presents some answers.

Table 8: Change in employment and wages with a 3 per cent nominal devaluation¹

	Total employ- ment	Primary		Non-primary		Real wages		MFPG ²	Capital: labour ratio
		Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled		
1994	100,0	100,0	100,0	100,0	100,0	100,0	100,0		
1995	100,0	100,0	100,0	100,0	100,0	99,6	99,6	100,1	100,6
1996	100,0	100,0	100,0	100,0	100,0	99,0	99,2	101,7	101,2
1997	100,1	99,9	100,0	100,1	100,1	98,3	98,7	103,2	101,9
1998	100,3	99,9	100,0	100,4	100,3	97,5	98,2	103,7	102,5
1999	100,5	99,9	100,0	100,6	100,5	96,6	97,7	104,2	103,2
<i>Period averages</i>									
1995-9	100,2	99,9	100,0	100,2	100,2	98,2	98,7	102,6	101,9

Source: Model computations.

Note: 1. Ratios to the base run.

2. Multifactor productivity growth.

As would be expected, the shift in the composition of exports towards the non-primary sectors has little impact on employment levels generally, increasing total employment by only 0,2 per cent relative to the base. Real wages of unskilled workers decline faster than those of skilled workers, raising the level of inequality in the modelled economy. Multifactor productivity increases slightly with respect to the base, as does the aggregate capital:labour ratio.

The data presented in these tables show that devaluation is not an employment-generating strategy. It is often argued that multifactor productivity growth will increase as the economy becomes more outwardly oriented, but again there was scant evidence of this effect. Labour's share of income decreases and, according to share data (not reported in the tables), capital improves its position. Still, there is not a large impact on investment and therefore not much increase in employment. By comparison with the first simulation, it is evident that a strategy which promotes the mining sector generates significantly more employment than policies which lower real wages through inflation induced by devaluation. The simulations show that more, not less, employment is generated with higher real wages for an approximately equivalent increase in exports. Strategies which promote the expansion of the mining sector not only create more jobs but also lower the level of inequality, compared to strategies which rely exclusively on currency devaluation.

Throughout the macroeconomic history of developing countries, organised labour and their representatives in government have opposed nominal devaluation on the grounds that it leads to lower real wages. Some economists have joined in, arguing that nominal devaluation fails to achieve its objectives and only contributes to a rise in the price level. Taylor (1991) has argued that for real devaluation to be effective in shifting the surplus to exports, some class of domestic consumers must suffer. Here it is labour and, as shown above, the burden falls disproportionately on unskilled labour.

However, what is most fascinating to observe is that the adjustment cost is shared more equitably than has been commonplace in South Africa (even though low-income wage earners are hurt worse). The unanticipated inflation has caused real wages to fall for all workers, skilled and unskilled. The wage equations allow more rapid recovery for skilled workers relative to unskilled ones (for the same rate of capacity utilisation) and thus the former fare better than the latter in terms of real wages. A more comprehensive measure of equity is the household Gini coefficient (not shown), since it takes into account not only real wage changes but also employment. The Gini coefficient is uniformly higher for this simulation compared to the first, but in both it increases throughout the forecast period.

Of course, it may be that organised labour will not tolerate the decline in real wages brought about by the devaluation and that wage bargains in the formal sector will quickly reflect increases in the price level. It remains to be seen whether inflation, which is modelled here as entirely unanticipated, will in fact be recouped. If so, then the real devaluation studied here would be undermined and the entire system of prices would ratchet upwards without having much effect on the allocation of resources.

5. CONCLUSIONS

The simple analectics of the two-sector model discussed at the beginning of this article suggest that an export-led growth strategy which concentrates exclusively on non-primary or manufactured exports may

encounter significant barriers to its successful implementation. Stimulating sectors which are operating below full capacity requires that demand be increased, and if this is attempted through currency devaluation, the results could be disappointing. Firstly, there is some trade-off between primary and non-primary exports, such that increasing the latter may come at the cost of decreasing the former. Secondly, while devaluation will stimulate exports, it may also have contractionary effects on demand that undermine the effect of higher exports on investment and growth. This is especially true when direct and indirect consumption of the primary goods are relatively small.

This all points to the more general conclusion that a strategy which ignores the primary goods sector will probably fail to have a significant impact on growth and employment. The sector is simply too large and too important as a producer of foreign exchange (Econometrix, 1995; *Business Day*, 1995) to be excluded from a growth strategy. The claim that trade liberalisation coupled with a more market-based approach to managing the mining sector can serve as the foundation for a successful, outwardly oriented development is fanciful from the perspective of this CGE modelling exercise. It ignores the crucial role of the State in research, exploration and development, on one hand, and in managing important macrovariables, on the other. At a minimum, the exchange rate must be kept in a competitive range and real wages protected to the degree that organised labour supports the general policy direction.

What is clearly required is a combination of policies which promote growth in the mining sector and currency devaluation to achieve a more balanced expansion of the economy. From simulations not shown here, it is evident that devaluation and growth in primary capacity are essentially additive in their impact. Growth in exports can lead to a significant increase in inequality, but if approached in a more comprehensive manner, can relax the balance of payments constraint very effectively, raising the 'speed limit' on economic growth. Some reduction in real wages is inevitable, but the result of successful policies to promote exports, combined with other elements of a comprehensive growth strategy, will be a substantial increase in formal sector employment.

Appendix: Devaluation in the analytical model

To see why the effect of devaluation on non-primary output is ambiguous, rewrite equation (7)

$$r(p_0 a_0 x_2 - p_1^* E_1 - p_2^* e x_2) + s[(rp_1^* - w_r l_1)x_1 + \tau x_2 / (1+\tau)] = A$$

where r is the real exchange rate, e/p_2 , and the real wage

$$w_r = w/p_2 = w(r), \quad w'(r) < 0$$

is written as a function of r to stress its dependence on the real exchange rate. This is immediate from the price equation:

$$w_r = [1 / (1+\tau) - r(p_0 a_0 + p_1^* a)] / l_2$$

Next solve equation (1) for E_1 and substitute:

$$r [p_0 \cdot a_0 x_2 - p_2^* \epsilon x_2 - p_1^* x_1 + p_1^* a x_2] + m w_r (l_1 x_1 + l_2 x_2) + s [(r p_1^* - w_r l_1) x_1 + \tau x_2 / (1 + \tau)] = A$$

where $p_0 a_0 x_2 - p_2^* \epsilon x_2 > 0$, which implies that the non-primary sector is a net importer; that is, it earns less from exports than it spends on imports. The first term on the left in square brackets is foreign savings less what workers consume of the exportable primary good, shown in the second term. The third term on the left, also in square brackets, is private savings. Observe that foreign savings unambiguously increases with x_2 . The sign with respect to r is less certain, however. On one hand, a rise in r increases the nominal value of foreign savings in the first term. On the other, a rise in r causes real wages to fall and thus the real value of foreign savings increases as exports rise. To simplify the notation, write:

$$r S_x(r, x_2) + S_1(r) + S_2(x_2) = A$$

where S_x is real foreign savings and S_1 is real savings out of profits for the two sectors. Differentiating with respect to r :

$$r (S_{rx} + S_{xx} dx_2/dr) + S_x + dS_1/dr + dS_2/dx_2 dx_2/dr = 0$$

with S_{rx} and S_{xx} the partial derivatives of foreign savings with respect to r and x_2 . Solving:

$$dx_2/dr = -(r S_{rx} + S_x + dS_1/dr) / (r S_{xx} + dS_2/dx_2)$$

The denominator of this expression is positive, but the numerator is mixed. The first term in the numerator is the expenditure switching effect; as the real exchange rate depreciates, exports rise and thus foreign savings falls. A small m implies that S_{rx} is also close to zero (probably not a bad assumption for South Africa); otherwise, $S_{rx} < 0$ since the other two terms in the numerator are positive for real devaluation ($w'(r) < 0$) and a current account deficit. Note that when m is small, equation (8) ensures that the PB locus is flat; neither the slope nor the intercept is affected by the devaluation. The level of m is irrelevant to the IS curve, so that it continues to rotate clockwise and shift upward. If the effect of the devaluation is stronger on the intercept than on the slope, it is contractionary and vice versa. The slope depends on savings in the non-primary sector and foreign savings, while the intercept depends on primary savings. If a substantial fraction of savings does flow from the non-primary sector, then contractionary devaluation is evidently more likely.

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