

## CHAPTER 8

### POLICY SIMULATION EXPERIMENTS AND IMPACT ANALYSIS

#### 8.1 INTRODUCTION

A second set of simulation experiments involves determining the sensitivity of endogenous variables of the model to changes in selected exogenous and policy variables. This is accomplished through impact multipliers that shed light on the dynamic properties of the model.<sup>90</sup> A number of policy shocks are considered for this exercise. In particular, the exercise deals with shocks emanating from both the demand side and the supply side. In addition the impacts of external shocks and a monetary policy shock are considered. The experiments are set such that sustained changes are made from 1988 to 2000 for each of the shock variables. The impacts of changes in these variables are presented in the form of percentage deviations from the base run.

Multiplier analysis is often considered relatively easy to pursue if the model is linear in both parameters and variables. In many cases however, some non-linearities are inherent in models. Under these circumstances, multipliers can be derived from either a linearised version of the reduced form of the structural model or by way of appropriately designed simulation experiments. Goldberger (1959:16-20) dwells on the procedure for computing impact multipliers for a non-linear system by means of linearising the non-linear structural relationship through the total differential with partial derivatives evaluated at the sample means of the variables. However, the multipliers derived in this way are valid only if the model consists of few non-linear equations, so that their linearization produces minimum loss of information. Moreover, the multipliers are valid only around a small neighbourhood of the sample means of the variables. This implies that the procedure can be counterproductive for fairly large models.

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<sup>90</sup> See Challen and Hagger (1983).

For this reason, an alternative approach that computes the multiplier as the difference between the shocked run and the base run simulated solutions for an endogenous variable divided by the base run outcome is adopted in this study. This approach has a merit over the Goldberger method in that it captures variations in the multipliers from one period to another. This method has been widely adopted by researchers such as Challen and Hagger (1983:151-159), Brooks and Gibbs (1994), Randakuwa *et al.* (1995) and Musila (2002).

This chapter is dedicated to the presentation and analysis of the multiplier properties of the model starting with fiscal policy shocks, monetary policy shocks and external shocks, with the view of assessing the potency of these policies and shocks in the economy. The analysis dwells more on fiscal policy shocks and external shocks and less on monetary policy shocks. This difference in emphasis is prompted by the recognition of the institutional and structural constraints the economy faces in exercising the latter.

## **8.2 FISCAL POLICY SHOCKS**

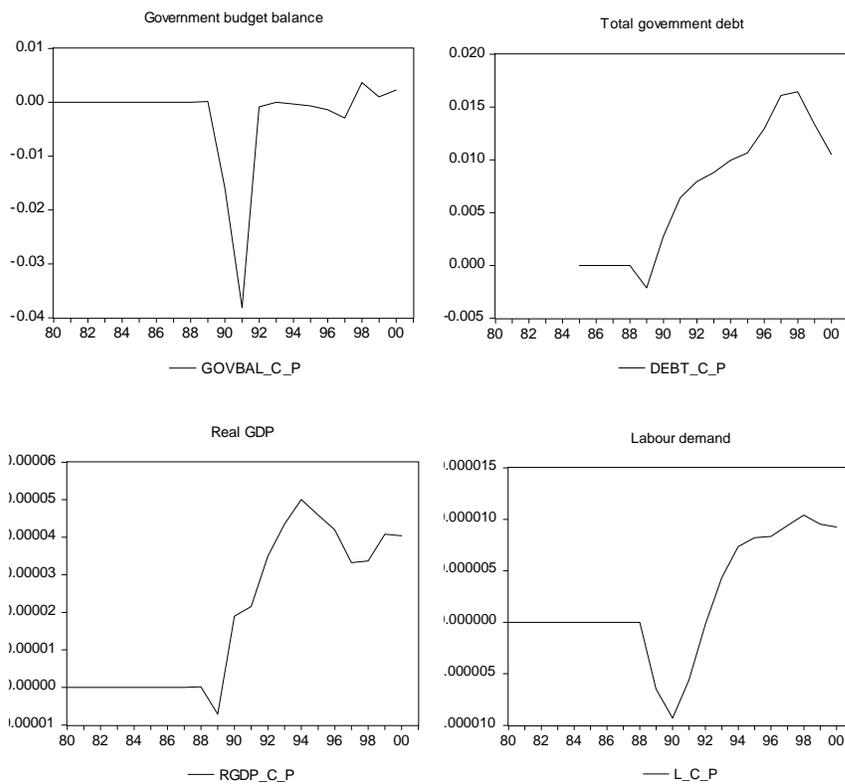
Fiscal policy shocks are presented in two parts, namely, government investment expenditure and government consumption shocks. The former represents a shock from the supply side of the economy and the latter represents a shock from the demand side. The basic idea is to compare the response of key macroeconomic variables to changes emanating from the supply side with similar changes from the demand side.

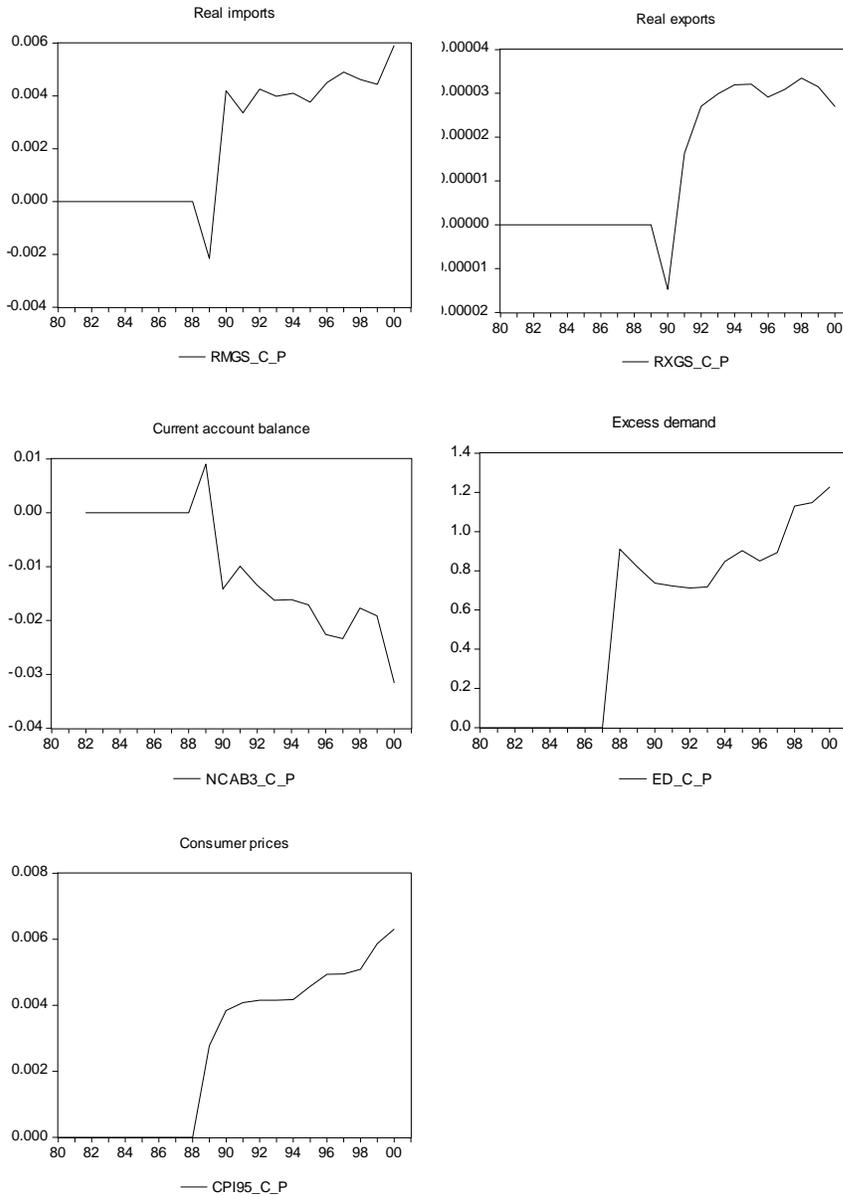
### **8.2.1 An increase in government consumption expenditure by 10 per cent**

An increase in government consumption expenditures by 10 per cent amounts to an increase of roughly 46 million Maluti in 1988 using 1995 prices. The results of this simulation are depicted in figure 8.1 below, for a number of key macroeconomic variables and in terms of percentage deviations from the base run. As expected, the result of this fiscal stimulation is an immediate worsening of the government budget balance. This development is however temporary as the government budget balance recovers rapidly from this position. In line with this development, total government debt rises for

the entire simulation period, with the rate of increase declining towards the end of the sample. As expected real domestic output rises for most of the simulation period, reaching a peak in 1994. The increase in real GDP is however preceded by a slight fall in 1989. The trend of labour demand closely resembles that of real GDP. Real imports of goods and services fall and rise with increases in real income in the initial periods and stabilize afterwards. A relatively similar trend is observed with exports of goods and services. It is evident that exports rise by a smaller magnitude than imports, hence a deficit in the current account balance. Excess demand in the economy increased directly through the increase in government consumption. This in turn causes a surge in consumer prices over the entire period.

**Figure 8.1 Simulation results of an increase in government consumption expenditure of 10 per cent**

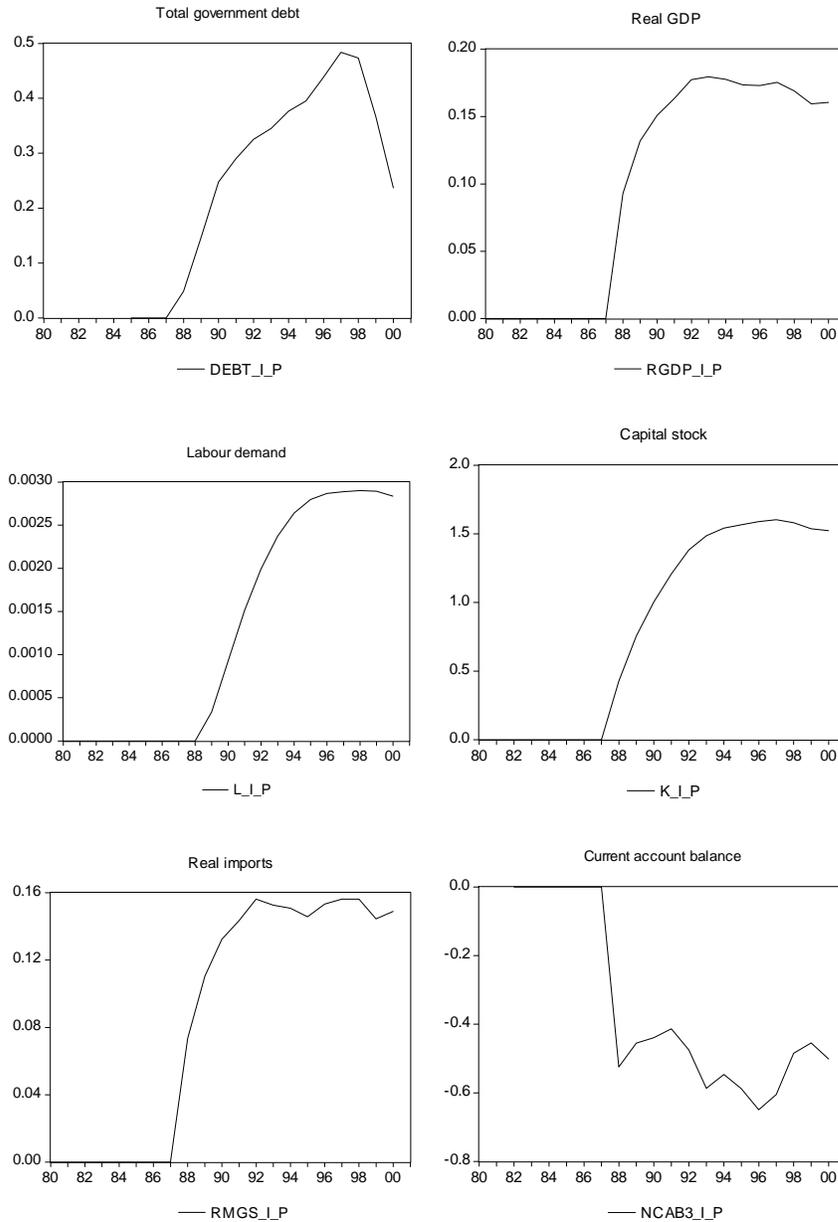




### 8.2.2 An increase in government investment expenditure by 10 per cent

In this scenario a rise in government investment expenditure is simulated by increasing this variable by 10 per cent from 1988 to 2000. The results of this simulation are displayed in figure 8.2.

**Figure 8.2 Simulation results of an increase in government investment expenditure by 10 per cent**



As in the case of government consumption expenditure, the immediate effect of an increase in government investment expenditure is a worsening of the government budget and an increase in total government debt in almost the same pattern as in the case of an increase in government consumption expenditure. This follows from the significant

dependence of domestic debt on the budgetary position of government. In comparison with an increase in government consumption expenditure of the same size, an increase in government investment expenditure brings about an increase in the overall level of economic activity of a higher magnitude. It is also notable that the increase in real GDP induced by a supply side shock is more sustainable compared to that of the increase in government consumption. A similar observation is made with the impact of an increase in government investment on labour demand and capital stock. Unlike in the case of a shock from the demand side, the increases in labour demand and capital stock are more stable and sustained for a longer period of time. Because of the strong dependence of imports on national income, real imports of goods and services rise with the rise in real domestic activity, while exports are hardly affected.

The results of this section confirm the ideology of supply side economics that shocks from the supply side bring about robust and sustained increases in real output while shocks from the demand side result in only temporary changes in real output with only sustained increases in the price level. Both policies have favourable results in terms of real output, but the effect of the supply side shock is more substantial in terms of output. An increase in government investment thus features more desirable outcomes as it also has robust and desirable impacts on the capital stock and employment.

### **8.3 MONETARY POLICY SHOCK**

#### **8.3.1 An increase in the nominal Treasury bill rate by 2 percentage points**

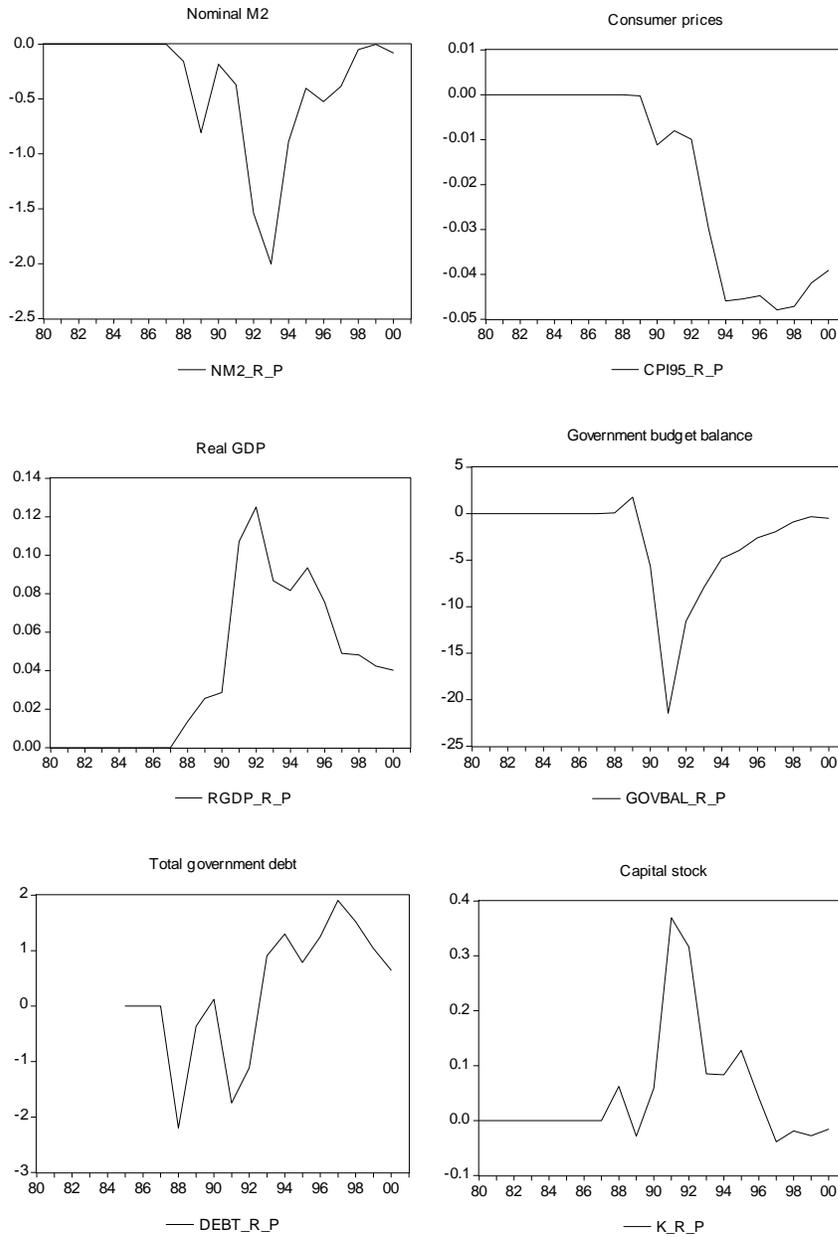
In agreement with the existing restrictions in exercising monetary policy by way of independent increases in money supply, a monetary policy shock is simulated in this study by increasing the nominal Treasury bill interest rate by two percentage points from 1988 to 2000.<sup>91</sup> Although changes in interest rates are said to largely follow similar changes in SA, the basis for this simulation is the fact that some changes in interest rates have been historically made without any corresponding changes in the SA money

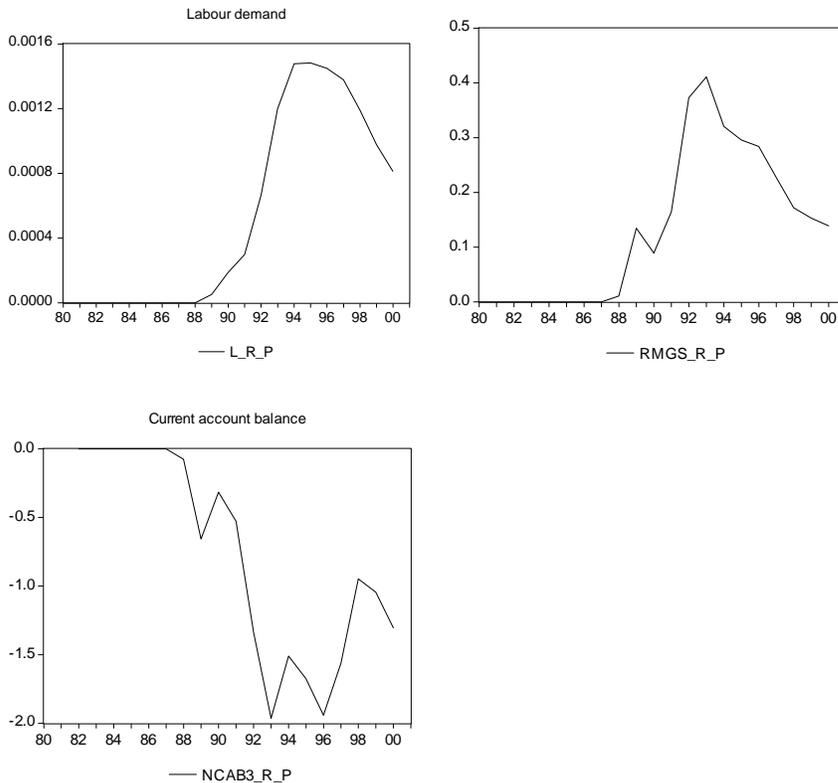
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<sup>91</sup> Because of the fixed exchange rate regime, money supply is assumed not to be available as an exogenous monetary policy instrument.

markets. The results of the increase in the Treasury bill rate are shown in figure 8.3 in terms of percentage changes from the base model.

**Figure 8.3 Simulation results of an increase in the Treasury bill interest rate by two percentage points**





The first effect of this policy is to lower the broad monetary aggregates, M2 and M3. This development is not sustained however, since the demand for demand deposits is negatively related to the Treasury bill rate of interest and the time and saving deposits are positively related to the Treasury bill rate. The increase in the interest rate induces a reduction in aggregate demand through investment and an increase through private consumption. The latter outcome is a result of the insensitivity of consumption to changes in the rate of interest and is indicated by the positive sign of the rate of interest in the consumption function, a result common in many developing countries. The final outcome is a fall in aggregate demand and hence, as expected, a fall in consumer prices. In turn, real output rises for the entire period though at a decreasing rate towards the end. This development is followed by trends in labour demand, capital stock and other components of aggregate demand. The increase in income induces a rise in imports and a deficit in the current account balance.

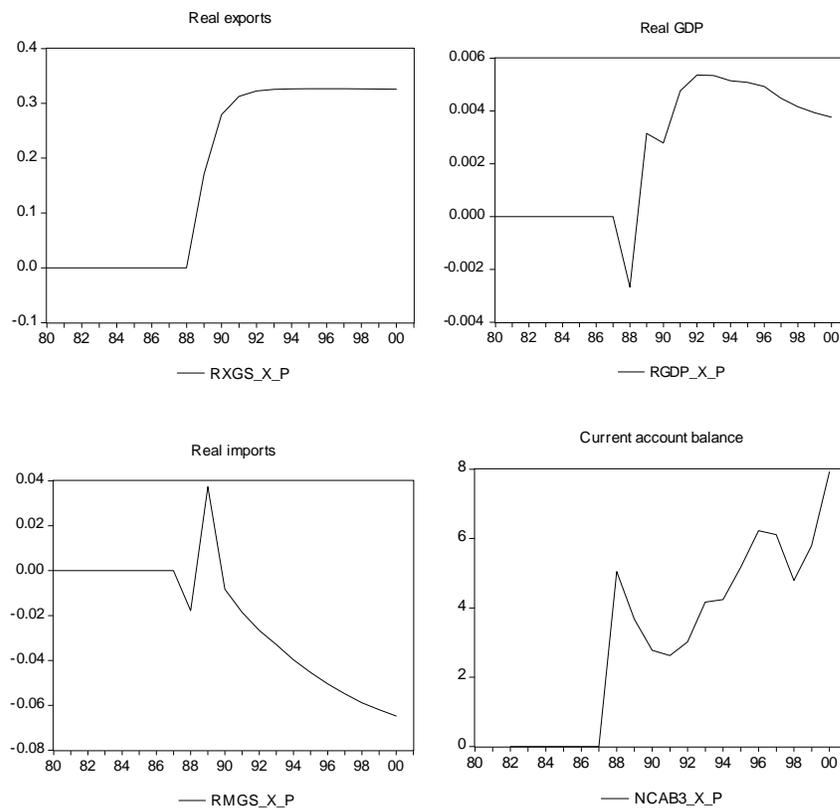
## 8.4 EXTERNAL SHOCK

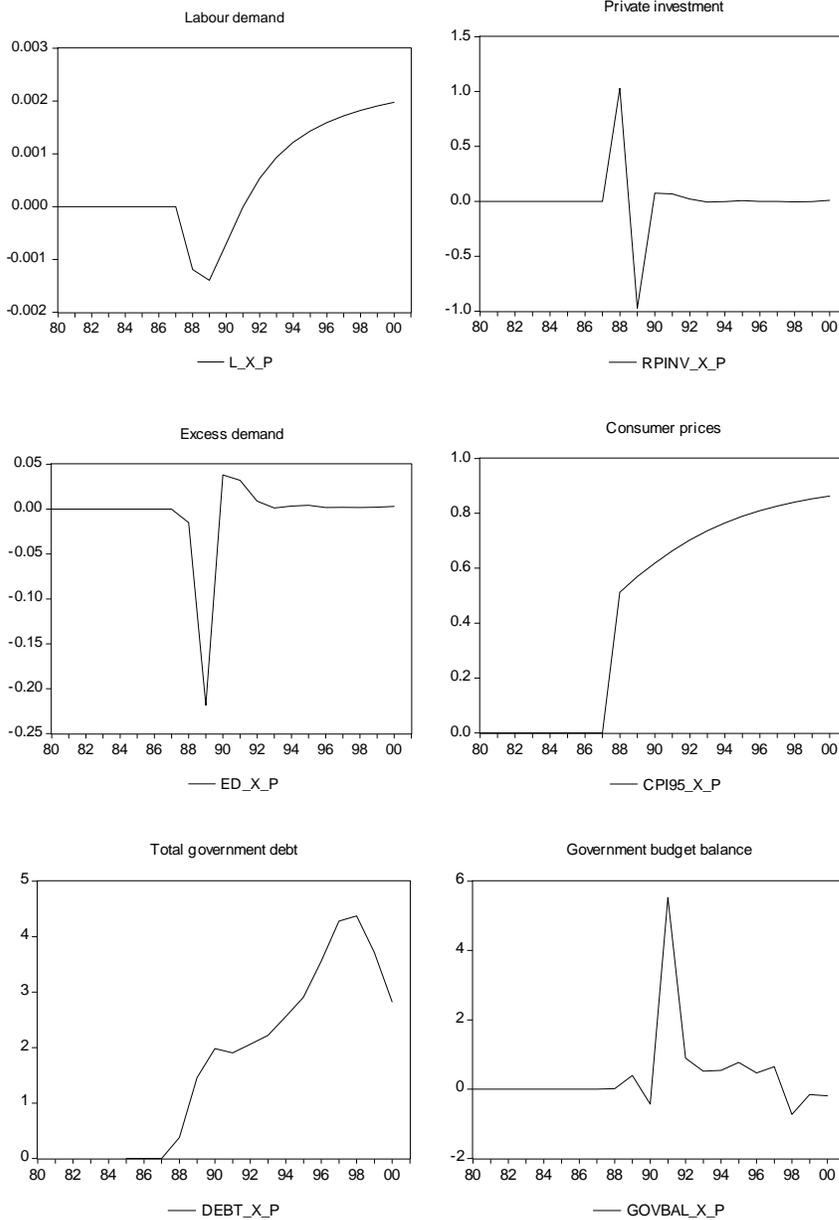
The effects of external shocks are simulated by a depreciation of the domestic currency. Given the high degree of openness of the economy, this shock is made to assess the susceptibility of the economy to external disturbances and to assess their potential impacts on the economy.

### 8.4.1 A currency depreciation of 5 per cent

A nominal exchange rate shock is simulated by a depreciation of the Loti against the US dollar by 5 per cent from 1988 to 2000. This is intended to entertain the belief that the Loti is overvalued in spite of the major depreciations in the 1990s. The results of this experiment are reported in figure 8.4.

**Figure 8.4 Simulation results of a depreciation of the currency by five per cent**





A depreciation of the currency by 5 per cent appears to encourage exports relative to imports as expected. The improvement in the competitiveness of exports is observed by way of a fall in export prices and a subsequent rise in exports. Correspondingly the depreciation of currency makes imports dearer, hence the rise in import prices and the fall in imports. This increase in exports is sufficient to curb the trend of deficits in the current account.

Due to the exchange rate depreciation, total government debt continues to increase steadily and tapers towards the end of the simulation period. A closer inspection of the debt variables reveals that it is the external debt component that stimulates an increase in total debt, as domestic debt falls in line with the slight improvement in the government budget deficit, following the depreciation.

However, the depreciation has some unpleasant costs to the economy. Consumer prices rise rather significantly for the entire period. This result is typical in highly open economies in which higher import prices that are triggered by a depreciation, are transmitted directly into higher domestic prices. Although real domestic output rises, the rate of increase is reduced towards the end through the inflation channel by which increased prices and costs of imported inputs reduce aggregate demand and output. A similar result was also obtained by among others Krugman and Taylor (1978), Edwards (1986) and Basdevant (2000). Developments in the level of employment closely track those of real domestic output. It is notable that changes in exchange rate have temporary effects on the capital stock, private investment, excess demand, the government budget balance and the overall balance of payments.

## **8.5 SUMMARY OF SIMULATION EXPERIMENTS**

The simulations run in this chapter have assessed the potential effects of the two major policy options, fiscal policy, in the form of both demand and supply side shocks, and monetary policy. In addition, the simulation experiments have permitted a feel of the potential effects of shocks that are external to the economy. As expected, fiscal policy has far more potential than monetary policy in affecting key macroeconomic variables such as the level of economic activity, employment, the government budget position and the balance of payments. With regard to fiscal policy, a supply side shock in the form of an increase in government investment expenditure will affect the economy in a more pronounced way than an increase in government consumption expenditure. The route of increasing government investment expenditure has the advantage of boosting real output,

employment and capital stock in a robust and sustainable manner. The policy is however costly as it crowds out private investment.

Though only one avenue has been explored with regard to monetary policy owing to limited flexibility in this area, the results nevertheless indicate that the policy still has some degree of potency in affecting macroeconomic variables. Many of the variables assessed seem to be reasonably responsive to changes in the Treasury bill rate although most of the effects are only short-term.

It is evident from these experiments that Lesotho is highly susceptible to external shocks. Changes in the exchange rate appear to affect not only external sector balances remarkably, but also other internal key variables such as the level of employment, the government budget position, debt variables, monetary aggregates and prices. It is noteworthy that, among the policy scenarios explored in this study, consumer prices appear to be most responsive to changes in the exchange rate.