ECONOMIC RESPONSES IN INDIA TO MACROECONOMIC SHOCKS

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CERTIFICATE

Certified that the dissertation entitled **"ECONOMIC RESPONSES IN INDIA TO MACROECONOMIC SHOCKS"** submitted by **Jeetendra Kumar Pandey** in partial fulfilment of the requirements for the award of the degree of **Master of Philosophy** is his own work. This dissertation has not been submitted for any other degree to this university or to any other university to the best of our knowledge.

We recommend this dissertation to be placed before the examiners for evaluation.

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J.K. Pandey

INTRODUCTION

Since independence, the Indian economy has been plagued by an economic crisis roughly once every decade. These have arisen from some combination of three factors, namely, food shocks, oil price shocks, and macroeconomic mismanagement. The various crises(1957-58, 1965-67, 1973-75, 1979-81, 1990-91) have manifested themselves in the form of inflation, BOP deterioration and decelerating output growth. Macroeconomic mismanagement including the inefficient use of international borrowings have been gradually pushing the country towards a debt default. The approach in this dissertation would consist of analysing these shocks using a simple model and attempting to infer the effects of the policies undertaken after the shocks of 1965-67, 1973-75, 1979-80.

In the short run, the normal emphasis of the policies is on quickly removing the symptoms of the economic crisis and in the medium run there are attempts to adjust the economy to the changed economic environment. A temporary shock can be effectively responded to through financial accommodation without recourse to structural adjustments. But the response to a permanent shock requires more than short-term stabilisation.

Surprisingly, the theoretical framework for the analysis of negative real shocks has not been well adapted to apply easily to developing countries. Supply management is a crucial part of managing these shocks but a lot depends on whether these are permanent or temporary.

A permanent oil shock poses very difficult problems for the economy. It has implications for the broader issues of the sustainable level of income, investment and the choice of techniques. This, in turn, has implications for the direction of public investment since there is a degree of substitutability between national oil consumption (an imported good) and electricity generation (a non-traded good). The latter requires huge public sector participation and enters the aggregate production of the economy. Hence, permanent trade shocks call for some type of structural adjustment. Some important theoretical points should be kept in mind: Firstly, since capital equipment is of putty-clay nature, factor intensities can only be altered at the design stage. Structural adjustment takes place faster if the economy manages to avoid slumps and a high investment rate is maintained. Macroeconomic policies which slow down capital formation directly conflict with structural adjustment. Secondly, since negative oil shocks cause a deterioration in the BOP, external pressures or simply an aversion to higher external debt may lead to expenditure reduction which fall unduly on investment. So, macroeconomic policy involves a tight-rope walk where it has to maintain a balance between rapid investment and short-run inflation and BOP control.

What happens to the goods market equilibrium is more complicated and depends on the structure of the economy, which in turn, influences the macroeconomic policies required to back up any structural adjustment programme after a permanent oil shock. The shock has two elements: a supply shock element and a transfer element. In the supply shock element, a rise in production costs shifts the aggregate supply curve backwards. The second element operates through the

demand side where a more adverse terms of trade lowers the purchasing power at home. If the first element dominates, the policy implication is that adjustment to new oil prices should not be supported by an expansionary policy regime in the short run. Expansionary demand policies will only lead to price increases. So, the prevailing structure of the economy during every crisis should be taken into account in devising economic policies.

Public deficits in India were, for a long time, kept at levels that could be financed without either excessive inflation or excessive debt creation. This was made possible by concessional foreign finance and artificially low interest rates on domestic government borrowings. But, the latter was achieved at the cost of serious weaknesses in the financial system. Regarding the soundness of fiscal policy, the direction of public investment has been a questionable aspect of past fiscal policy. Input subsidies constitute a very large part of the public sector deficits. The input subsidies into agriculture are a partial offset to inefficient input production (without subsidies) and low output prices as compared to world prices maintained through trade controls.

Project selection in the public sector has been characterised by many ills. Comparative advantage has been neglected, too many projects have been sanctioned with the consequent delayed implementations leading to heavy cost escalations. Politics has prevailed over economics in selection of investment projects. Consequently, projects have failed in achieving their financial objectives as well as their broader objectives which it normally stands for. Normally, the quantitative aspect of the saving-investment gap that gives the current account

deficit is emphasised. But, a large part of the resource gap is due to the wastage of resources in the public sector which stretches from project selection to project implementation as well as in day to day operations.

If fiscal impulse is to be output stabilising, it should be positive when output is below trend and vice- versa. However, output relative to trend has not been the guide for fiscal policy. It is the inflation rate, for which data is quickly available, which serves as the main guide to fiscal policy as well as to monetary policy. Therefore, if the forces behind inflation are not understood, there are chances of repeated macroeconomic policy mistakes.

Besides, the BOP constraint is a major factor influencing fiscal policy in the medium run. The safe range of the fiscal deficit can be made wider either through concessional borrowings or through a rapid export growth. So, overcoming the BOP constraint should be a major policy objective. The advantage of export-led growth over other components of aggregate demand is that it narrows the foreign exchange gap while the latter widen it.

Another advantage of export-led growth is that there are dynamic gains through technological change and entrepreneurial dynamism which result from interaction with broader markets. However, there are reasons for doubting the efficacy of macro-instruments in permanently raising a country's export growth. They serve best as providing a take-off to a country's export drive. From an individual country's point of view, the most effective solution is to improve non-price competitiveness of it's exports with intensive focus on technology absorption and

training. But these strategies are unlikely to achieve spectacular results in the short run.

India's macroeconomic policy on the export front has been partially hampered by inadequate depreciation of the real exchange rate and the high cost structure resulting from high tariffs and the import substitution policy. This also resulted in imports being restricted to a bare minimum. As a result, adjustments in periods of crisis through altering import volume and composition became very difficult. Depreciation of the exchange rate as an instrument for improving the current account deficit is perhaps at best used for crisis management. In the longer run, adequate growth of exports can be achieved adequately by controlling inflation and building up institutional structures to guide the exporters in developing non-price competitiveness.

With this view in mind, we divide the scheme of our work into the following chapters:

1. A theoretical model for analysing stabilisation
2. An econometric model for studying shocks
3. Shocks, policy response and simulations

CHAPTER ONE

A theoretical model for analysing stabilisation

1.Features of the model[1]

In this section we provide a compact survey, starting with a simple model and progressively introducing complications. We begin with a Keynesian model which assumes that nominal wages are fixed over the time horizon of policy. Money supply is regarded as a policy instrument under the complete control of the monetary authority. Analysis of the financial sector is simplified by the assumption of immobility of capital. We assume that we are analysing a small country. The following equations define the model:

$$(1.1) \qquad Y = Z + G_0 + B$$

This equation describes the demand for output in the home country. Output must equal the expenditure by the domestic private sector (Z), expenditure by the government (G_0) plus the trade balance (B), all measured in terms of domestic output.

$$(1.2) \qquad Z = Z(Y , r , A/P)$$

$0<Z_y<1$, $Z_r<0$, $Z_{A/p}>0$.

Expenditure by private the sector is a function of real income (Y), interest rate (r), and the real wealth of domestic residents (A/P) which is the sum of money and domestic bonds deflated by the domestic price (P).

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[1] Marston, R. "Stabilization Policies in Open Economies." *In Handbook of International Economics*, edited by Jones, R.W. and Kenen, P.B. Amsterdam: North Holland, 1985 from

(1.3) $B = B(Z, Z^f, P/X.P^f)$

$-1<B_z<0, 0<B_f<1, B_{P/X.P}{}^f<0$.

Trade balance (B) is a function of domestic expenditure (Z), foreign expenditure (Z^f), and the terms of trade defined as ($P/X.P^f$) where P and $X.P^f$ are prices of domestic and foreign goods respectively in domestic currency, and X is the domestic currency price of foreign currency. $B_p<0$ implies that the trade balance is assumed to be negatively related to the terms of trade (Marshall-Lerner condition).

(1.4) $Y = Q(P/W_0)$

This is the aggregate supply curve which describes the response of output to increase in the price of the domestic good, holding constant the nominal wage (at W_0).

(1.5) $M/P = m(Y, r, A/P)$

$m_Y>0, m_r<0, 0<= (A.m_A/M) <=1$

This is the demand function for money. The restriction on wealth elasticity includes two limiting cases: the demand for money can be independent of wealth, as in quantity theory of money, or can be homogenous of degree one in wealth, as in some asset models.

(1.6) $X.dF^m = B$

This is the balance of payments equation describing the accumulation of foreign exchange reserves F^m.

Given Z^f, P^f, G_0, W_0, M and A, equations (1.1), (1.4), (1.5), (1.6) jointly determine four variables: P, Y, r and F^m or X depending on the exchange rate regime.

In the case of a flexible exchange rate regime, B=0 so that :

(1.1)' $Y = Z+G_0$

From this equation, the government spending multiplier is:

(1.7) $dY/dG0 = 1/(1-Z'_y) > 0$

which is independent of the parameters of the trade balance and identical to the multiplier for a closed economy. The flexible exchange rate regime insulates the economy from foreign disturbances (changes in foreign prices and in foreign expenditure). This has often been used as an argument for flexible rates; but the result is very sensitive to the assumption about capital mobility.

In the fixed exchange rate case, the trade balance directly affects output, so the effect of domestic policy are modified by interaction with the foreign sector. Both monetary and fiscal policy are generally less effective in changing domestic output than under flexible rates, because of the leakage of expenditure into imports. The government multiplier for a fixed exchange rate regime is:

(1.8) $dY/dG_0 = 1/(1-Z'_y\{1+B_z\})$.

Which is smaller than the multiplier in (1.7) since $-1<B_z<0$. A rise in government spending (assumed to be on domestic goods) leads to a leakage of private expenditure into imports whereas in the flexible exchange rate case, the exchange rate depreciates resulting in higher exports to compensate to compensate for the higher imports.

If a country with fixed exchange rate has a BOP deficit with unemployment, there is a conflict between external and internal balance. This situation calls for the application of expenditure switching policies, and one such policy is devaluation

(change in X). In the above model. devaluation unambiguously leads to a rise in domestic output and improves the trade balance:

(1.9) $$dY/dX = -B_p/\{1-Z_y(1+B_z)\} > 0$$

(1.10) $$dB/dX = -B_p(1-Z_y)/\{1-Z_y(1+B_z)\} > 0$$

2.Capital mobility and the Mundell-Flemming propositions

Once capital mobility is introduced, the model gets complicated because it includes wealth effects and price effects and because domestic securities and foreign securities may be imperfect substitutes. This modified model is depicted by the following set of equations:

(2.1) $Y = Z + G_0 + B$

(2.2) $P.Z/I = Z\ (\ P\{Y-T\}/I\ ,\ r-\Pi_I\ ,\ r^f+\Pi_X-\Pi_I\ ,\ A/I\ )$

$0<Z_y<1\ ,\ Z_f<0\ ,\ Z_A>0$

This is the modified form of the expenditure function to incorporate the terms of trade and wealth effects that may be particularly important when there are flexible exchange rates. Here, I is the generalised price index $\{= P^a(P^{f*}X)^{1-a}\}$ where 'a' is the weight of domestically produced goods in the economy. I serves as a more appropriate deflator. $A(= M+H^d+X^*F^d)$, is the wealth of the domestic private sector consisting of domestic money M , domestic bonds H^d , and foreign bonds F^d. In this model, private expenditure is expressed as a function of the domestic interest rate r, the foreign interest rate r^f, real assets(A/I), and real disposable income(Y-T). The return on domestic bonds equals the real domestic interest rate while that on foreign bond is the sum of real foreign interest rate $r^f-\Pi_I$ and the expected appreciation of the foreign currency Π_X . Both interest rates are expressed in real terms by

subtracting the expected rate of inflation on the general price index Π_I (we assume that foreign prices are constant). Π_I and Π_X are defined as follows:

$$\Pi_I = a.\Pi_p + (1-a)\Pi_X$$

$$\Pi_p = e_p(P/(P-1)$$

$$0<e_p<1$$

$$\Pi_X = e_X(X/(X-1)$$

$$0<e_X<1$$

These expectations can be modelled in various ways. The equation for trade balance is the same as before:

(2.3) $$B = B(Z, Z^f, P^*X/P^f)$$

$$-1< B_z < 0,\ B^f > 0, B_p < 0.$$

(2.4) $$Y = Q(P/W_0)$$

The model is identical to the earlier one except for the expenditure equation (2.2) where expenditure and disposable income are deflated by the general price index thus incorporating the Laursen-Metzler effect of a change in terms of trade: A fall in terms of trade , which reduces P/I, leads to a fall in domestic expenditure measured in terms of the general price index but a rise in domestic expenditure in terms of the domestic good itself. These equations for goods market give the four endogenous variables of our interest :Y , P , r , and X or $X.F_m$. But according to (2.4), changes in P are always related to changes in Y ($dP= dY/Q_p$) so that we can eliminate price from all the equations in the model and concentrate on only three variables. The curve labelled GG in figure 2.1 gives the gives the combinations of Y

and r that gives equilibrium in the goods market. The slope of the curve reflects the direct effects of output and interest rates on expenditure (as well as the direct effects of domestic price). To obtain the expressions for this slope we first take the total differentials of (2.1) , (2.2) , (2.3) and (2.4) as represented in the following matrix. This matrix effectively represents three equations in three variables because dFm=0 in the flexible exchange rate case, and dX=0 in the fixed exchange rate regime. The first row describes the goods market equilibrium, the second the money market equilibrium and the third the bond market equilibrium.

$$\begin{vmatrix} (G_Y+G_P/Q_P) & G_X & 0 & G_r \\ (L_Y+L_P/Q_P) & L_X & -(1+s) & L_r \\ (H_Y+H_P/Q_P) & H_X & s & H_r \end{vmatrix} \begin{vmatrix} dY \\ dX \\ X.dF_m \\ dr \end{vmatrix} = \begin{vmatrix} dG_0 \\ dH_0^m \\ -dH_0^m \end{vmatrix}$$

where,

$G_Y= [1-(1+B_Z)Z_Y] >0$

$G_P= (1+B_Z) [\lambda - a^*e_p(Z_r+Z_f) + a^*Z_A^*A] - B_P >0$

$\lambda= (1-a) [Z - Z_Y(Y-T)] >0$

$G_X= -(1+B_Z) [\lambda + e_X(Z_r(1-a) - Z_f(a)) + Z_A(F^d - A(1-a))] + B_P <0$

$G_r= -(1+B_Z)Z_r >0$

$L_Y=m_Y >0$

$L_r= m_r <0$

$L_P= [m_Y^*Y(1-a) + a(m(.) - m_A^*A)] >0$

$L_X= [(1-a) (m(.) - m_Y^*Y) - m_r^*e_X + m_A(F^d - A(1-a))] >0$

$H_Y= h_Y <0$

$H_r = h_r + h_r^f > 0$

$H_P = [h_Y{}^*Y(1-a) + a(h(.) - h_A{}^*A)] < 0$

$H_X = [(1-a)\,(h(.) - h_Y{}^*Y) + h^f(.) + (h_r^f - h_f)e_X + h_A(F_d - A(1-a))] > 0$

The definitions of the coefficients in the matrix are given in the table above. All the prices including the exchange rate have been assumed to initially equal unity. The sign of the coefficients follow from the assumptions in equations (2.1) , (2.2) , (2.3) and (2.4). Also, for λ to be positive, the elasticity of expenditure with respect to disposable income should be less than unity, which ensures that the Larsen-Metzler effect obtains (i.e. a fall in terms of trade leads to an increase in expenditure measured in terms of domestic goods). Also, for G_X to be negative, the relative price effect must dominate the effect due to expectations and asset changes. When G_X is negative, a rise in the exchange rate shifts the GG schedule in figure (2.1) to the right.

As far as the behaviour of the asset markets are concerned, it is assumed in the asset model below. Three assets are assumed to be available to the domestic investors: domestic money M, domestic bonds H^d, and foreign bonds F^d. Foreign investors may hold domestic bonds but not domestic money. The domestic demand

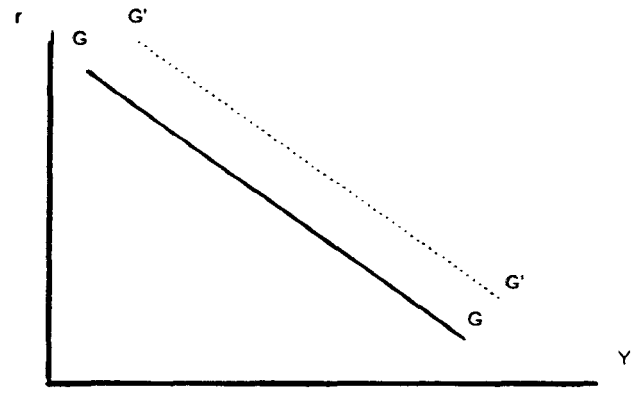


Figure 2.1

for the two domestic assets is given by equations (2.5) and (2.7). domestic demand is given by equation (2.9) and the foreign demand for domestic bonds By equation (2.8).

(2.5) $M=m[\ P.Y/I\ ,\ r-\Pi_I\ ,\ r^f+\Pi_X-\Pi_I,\ A/I\ ]\ I\ =H^m + F^m$

$0<Y.m_Y/M<=1\ ,\ m_r<0\ ,\ m_{rf}<0\ ,\ 0<=A^*m_A/M<=1$

(2.6) $H_d + H_f = H_0 - H_m$

(2.7) $H_d = h[P.Y/I\ ,\ r-\Pi_I\ ,\ r^f+\Pi_X-\Pi_I,\ A/I\ ]\ I$

$h_Y<0,\ h_r>0,\ h_{rf}<0,\ 1<=A.h_A/H^d$

(2.8) $H^f/X = h^f[\ Y^f\ ,\ r-\Pi_X-\Pi_I,\ r_f-\Pi_I,\ A^f/P^f\ ].P^f$

$h^f_Y<0,\ h^f_r>0,\ h^f_{rf}<0,\ hA>0$

(2.9) $X.F^d = f[P.Y/I\ ,\ r\ ,\ r^f+\Pi_X\ ,\ A/I\ ].I$

$f_Y<0\ ,\ f_r<0\ ,\ f_{rf}>0\ ,\ 1<=A.f_A/X.f_d$

These restrictions on the partial derivatives reflect the following restrictions: (a)All assets are gross substitutes i.e. a rise in own return raises demand and a rise in cross returns lowers demand. (b) a rise in income raises the demand for money

and lowers the demand for other assets but income elasticity of money demand is less than or equal to unity. (c)a rise in wealth leads to an equal to or less than proportionate rise in the demand for domestic and foreign bonds and an equal or less than proportionate rise in the demand for money.

The supply of money (equation (2.5)) equals the assets held by the central bank which consists of domestic and foreign bonds. The supply of domestic bonds (equation (2.6)) consists of the total government issues less that held by the central bank. The supply of assets is related by stabilisation policy:

(2.10) $dH^m = dH_0^m + s.dF^m$

where, s = sterilisation coefficient; dH_0^m = discretionary changes in domestic assets by the monetary authority; s.dFm = endogenous response of domestic assets to a change in foreign exchange reserves through stabilisation.

In figure (2.2a), the curves LL and HH describe combinations of Y and r that give equilibrium in the money market and domestic bond market. The slope of these curves can be obtained from the equilibrium condition of the two markets summarised in the second and third rows of the compact matrix. For L_X and H_X to be positive, the transactions effect and the expectations effects must outweigh the wealth effects in cases where the latter is negative. The relative slopes of LL and HH follow from the assumptions regarding gross substitutability and wealth elasticities above. The HH schedule becomes perfectly elastic when the domestic and foreign bonds become perfect substitutes.

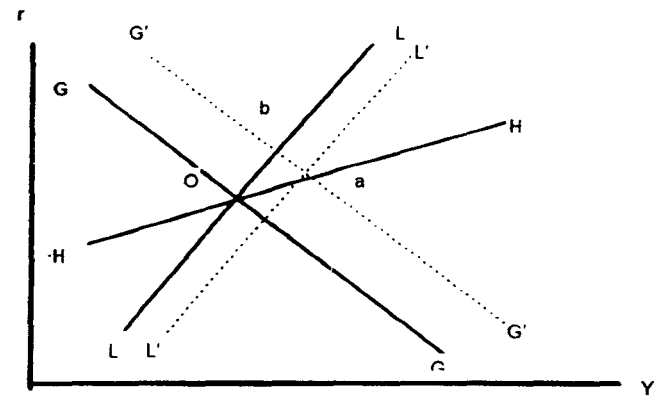


Figure 2.2a

stabilisation policies under fixed exchange rates

The above system of equations is recursive under two alternative assumptions:

(a) with s=0, the equilibrium output and interest rate is determined by the goods and the bond markets and the changes in reserves determining money market equilibrium. In terms of figure (2.2a), equilibrium is determined by the GG and HH schedules and the LL curve shifting in response to changes in foreign exchange reserves. An increase in bond-financed government spending (falling exclusively on domestic foods) takes the equilibrium from o to a in figure (2.2a) in the case of zero sterilisation. The HH curve doesn't shift because the government deficit generating a flow supply of bonds doesn't affect the current variables (assuming that there are no discrete changes in bond supply capable of affecting current variables). Thus, there is an increase in output and interest rate. The money market equilibrium requires a rightward shift of LL schedule meaning an accumulation of foreign reserves. The shift of the LL curve is accompanied by the change of foreign exchange reserves resulting from the domestic and foreign demand for the domestic bond vis-a-vis

foreign bonds. The magnitude of the increase of foreign exchange reserves depends on the degree of substitutability between domestic and foreign bonds, as reflected in the slope of HH. Perfect substitution between domestic and foreign bonds (HH horizontal) implies that the output will increase without a change in interest rate.

(b) with s=-1, the goods and the money market determine equilibrium and the bond market determining the changes in reserves. Equilibrium is determined by GG and LL schedules with the HH schedule shifting in response to changes in foreign exchange reserves. Sterilisation modifies the effect of fiscal policy but output and interest rate still increase. If there is complete sterilisation, then the new equilibrium is found on an unchanging LL schedule at point d (figure 2.2b). The increase in money supply associated with the influx of foreign exchange reserves is neutralised by the sale of domestic bonds to the public. With the assumed relative slopes of LL and HH, the rise in interest rate is sharper than in the case of zero sterilisation in this case.

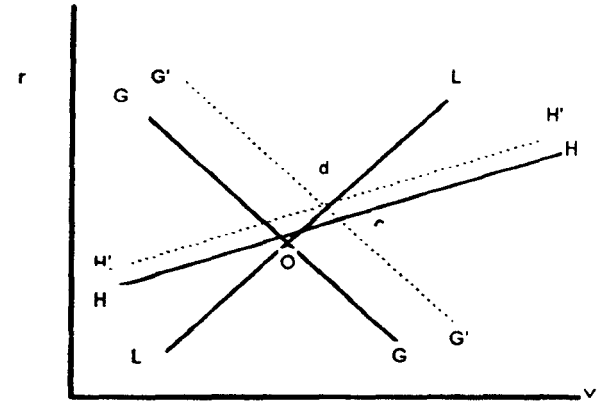


Figure 2.2b

Sterilisation runs into problems if there is a high substitutability between domestic and foreign bonds. The greater this substitutability, the greater is the change in foreign exchange reserves associated with fiscal policy. This is because a greater substitutability implies that even a very small increase in domestic interest rate leads to a high increase in the foreign exchange reserves. The sterilisation is thus limited by the amount of domestic bonds in supply.

The subject of monetary policy (a simple open market purchase of domestic bonds which reduces the supply of bonds) is highly contentious with many economists contending that monetary policy is powerless to affect domestic output and interest rates. This is because expansionary open market policies by the central bank may be completely offset by a loss of foreign exchange reserves. This can be seen diagramatically in figure (2.3) below. However, if the offset through loss of foreign exchange is less than complete, monetary policy retains some of its effectiveness.

In figure (2.3), open market operations shift the HH schedule rightwards to H'H' and LL to L'L' . but the foreign exchange loss leads to an offset of the money supply and thus shifts L'L' to L"L" towards the left showing a negative offset effect of open market operations. There would be complete offset only when there is a complete substitutability between domestic and foreign bonds i.e. H_r equals ∞.

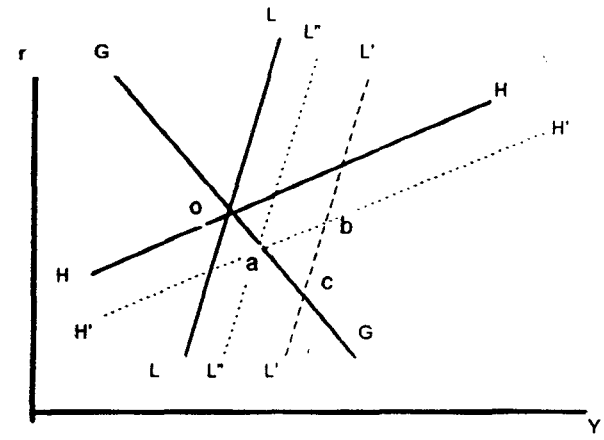
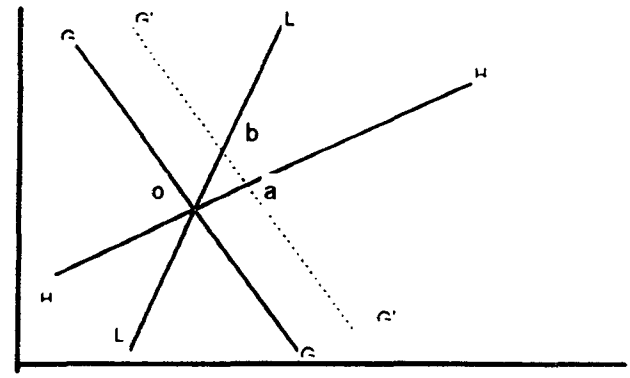


Figure 2.3

Stabilisation policies under flexible exchange rates

under flexible exchange rates, the above system determines domestic output, the interest rate and the exchange rate. Foreign exchange reserves are exogenous. Flexible exchange rate leads stabilisation policy to affect the equilibrium in all markets. An expansionary fiscal policy (increase in government expenditure on domestic goods) leads to an appreciation of the domestic currency which would affect all three curves in the diagram: It will dampen the rightward movement of GG. Also, as X falls, the demand for both money and bonds falls (L_X and H_X are both positive as assumed earlier). As a result LL shifts to the right while HH shifts to the left. The economy ends up in the triangular area abo in the figure (2.4) below:

figure (2.4)



If domestic bonds are perfect substitutes, and if money demand is independent of the exchange rate, then only a constant output is consistent with a constant money supply, and output and the interest rate do not change as a result of fiscal policy. But, under general conditions, fiscal policy should change domestic output.

Monetary policy (open market purchase of domestic bonds) under flexible exchange rates leads to depreciation of the domestic currency. This shifts the asset market schedules: LL shifts to the right; reduction in bond supply shifts HH to the right (to H'H'). The increase in money supply leads to a depreciation of domestic currency. The depreciation itself leads to an equilibrium somewhere in the triangle abc (in figure 2.3) with output increasing and the interest rate declining.

In the limiting case of perfect substitution between domestic and foreign bonds, monetary policy is still effective in changing output since there is no change in foreign exchange reserves to offset the open market operations. In this limiting case, open market operations and foreign exchange intervention are equivaient in

effect, since it doesn't matter whether domestic bonds or foreign bonds are exchanged for money.

In the following section, we relax the assumption of fixed nominal wages.

3. Flexible wages and the monetary approach

With the rise of inflation in recent decades , the assumption of rigid wages is untenable. So, wage flexibility should be a feature of open economy macroeconomic models. Now, output becomes a function of terms of trade (following from the labour market behaviour and a production function) and replaces (2.4).

(3.1) $Y= Q^s(P/P_f.X)$

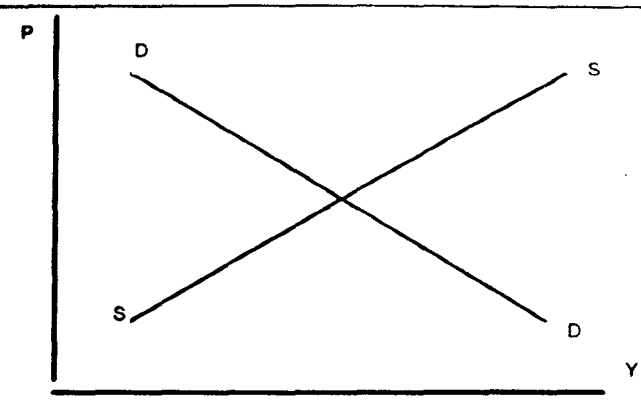
With this aggregate supply equation, put in the original model, we still have a system of four equations determining Y, P, X and Fm. This system is, however, more difficult to describe since P cannot be easily eliminated from the system. To make the system more manageable, we replace the bond equation with an uncovered interest parity condition ($r= r^f+\Pi_x$). This allows us to eliminate the domestic interest rate from the other three equations. One can write the AD and AS equations in the differential form, solving for domestic price in order to show the adjustment of price more clearly:

(3.2) $dP = dX + dY/Q_p^s$

(3.3) $dP = - G_x/G_p - G_y/G_p.dY + dG_0/G_p$

These equations can be illustrated in the Y - P space in figure (3.1) below:

figure (3.1)



These two schedules alone determine domestic output and price. The money market equation determines the change in foreign exchange reserves recursively (under fixed exchange rate regime). If, however, exchange rate changes, both schedules are affected.

Effect of devaluation under flexible wages

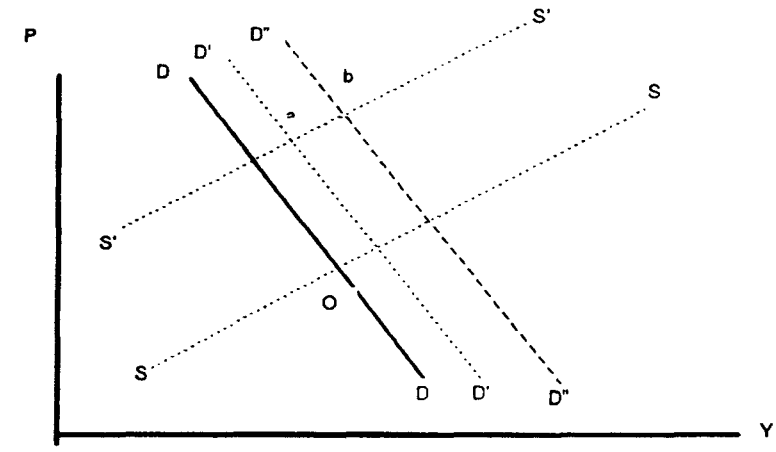
As a result of devaluation, there is an increase in aggregate demand (upward shift of the DD schedule). Whether this movement is proportional to the change in exchange rates is crucial in determining the net effect of devaluation. The vertical shift of the DD curve is as follows: (from equation

(3.4) $dP/dX = 1 - (1+Bz).Z_A.(A-F^d)/G_p$

The upward shift in the aggregate demand schedule is less than proportional to the devaluation if $Z_A>0$, where, Z_A is a derivative of expenditure with respect to real wealth. Devaluation reduces the real domestic wealth and the sensitivity of aggregate demand to real wealth hold down the increase in aggregate demand. Aggregate supply curve also adjusts upwards because of increase of nominal wages

induced by the higher domestic price for foreign goods. From figure (3.2), it is evident that output actually declines and domestic price rises less than proportionally in response to devaluation (the equilibrium shifts from point o to point a because the equation (3.4) implies that a shift in the aggregate demand curve is less than proportional to the devaluation under the condition $Z_A>0$).

figure (3.2)



With changes in exchange rate affecting changes in real wealth, the devaluation has real effects despite flexibility of wages. The fall in output and the terms of trade generates a trade surplus in the devaluing country. The immediate effect of devaluation is different from it's longrun effect. This is because the ensuing trade surplus leads to a flow increase in wealth:

(3.5) $dA = P.B > 0$

which moves the shortrun market equilibrium towards a longrun steady state where $dA/A = dX/X$, and wages and prices increase in the same proportion and output returns to the initial level.

The process of wealth accumulation is an essential feature of the monetary approach to the balance of payments. The description of how an economy responds to devaluation differs markedly from the absorption approaches. In the absence of wealth effects, the equilibrium is reached at point b in figure (3.2). The devaluation, in this case, leads to an immediate proportional rise in domestic price (terms of trade remaining constant) and there is no change in output and employment.

While the Keynesian model predicts that devaluation will raise output and improve the balance of trade, the Classical model predicts that it's main effect will be on domestic prices. When the trade balance improves because of wealth effects, the Classical model predicts a decline in output rather than an expansion as predicted by the Keynesian model.

In choosing between these alternative models, the time-frame and more particularly the wage flexibility in the economy, become very important.

Effect of fiscal and monetary policy with flexible wages

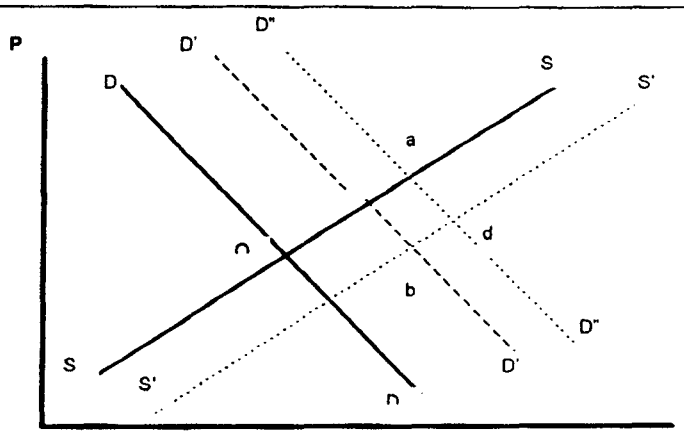
We have seen that monetary policy in the Keynesian model with fixed exchange rate is powerless to affect output as long as domestic and foreign bonds are perfect substitutes. However, if there is imperfect substitution between domestic and foreign bonds, monetary policy can affect output in both models.

The effect of monetary policy in the classical model is similar to that of devaluation (as open market purchase lead to depreciation of the currency). As in the case of devaluation, there is no effect of output in the longrun as real wealth returns to it's original level. If domestic and foreign goods are perfect substitutes, so

that domestic and foreign prices are linked by PPP(purchasing power parity), then output is unaffected even in the shortrun. The primary effect of monetary expansion is to drive up prices in proportion to the depreciating exchange rate. If expenditure is a function of real wealth, monetary expansion even lowers output.

Increases in government spending have different effects than monetary policy if government spending falls entirely upon domestic goods. Whether the exchange rate is fixed or flexible, a rise in government spending causes a rise in the terms of trade between domestic goods and foreign goods. To the extent that labour supply is sensitive to real wages, a rise in the terms of trade raises domestic output even with perfectly flexible wages. In the case of a fixed exchange rate, the terms of trade improvement is effected through an adjustment of domestic prices. Government spending moves the equilibrium from point o to point a in figure (3.3) below:

figure 3.3



Under flexible exchange rate system, the terms of trade improvement is effected through changes in exchange rates(appreciation). In the absence of wealth effects on aggregate demand and demand for money, the appreciation causes both

aggregate demand and aggregate supply curves to shift down proportionately from point a to point b. The appreciation has no net effect on output, so point a must be directly below point a.

when wealth effects are present, the ensuing appreciation raises the output further. This is because in the presence of wealth effects, the value of foreign assets increases in terms of the domestic currency. Consequently, the aggregate demand falls less than proportionately to the appreciation. In that case, equilibrium is reached somewhere on the bd segment on the S"S" schedule.

The sharpness of the above results would be blunted when government spending falls on domestic as well as foreign goods. However, the above results concerning government spending would retain their essence if government spending is predominantly on domestic goods. However, if government expenditure consists predominantly of imported goods, the above results would be reversed.

CHAPTER TWO

An Econometric Model for studying shocks

1. The Model

The model is made general enough to take into account the most important macroeconomic instruments and targets that are suitable in the Indian case. The structure of the model can be trapped in the following equations. The goods market equilibrium is given by

1. $Y-[CH+CG+I+G+X-IM]=0$

This is the basic national identity expressed in real terms. Here, CG is the consumption of the government sector, CH is the consumption of the household sector, I is the investment in the private sector, G is the investment in the public sector, IM is imports, X is exports and Y is the national income. CH and CG are different because their behaviour and linkages are very different.

2. $MD - MS= 0$

This equation represents the money market equilibrium. MD is the money demand and MS the money supply.

3. $I = I(\overset{+}{I_o}, \overset{+}{NDC}, \overset{-}{r}, \overset{+}{CIM}, \overset{+}{dY})$

This equation represents the investment function. It captures the growth aspect of the economy and is modelled to depend on the domestic credit, interest rates, trade policy (import of K goods and intermediate goods &dY). Here, I_0 is the autonomous investment, NDC is the net domestic credit, r is the interest rate, CIM is the import of intermediate and capital goods, dY is the change in national income.

4. $$G = G(\underset{-}{I(t-1)}, \underset{+}{FA}, \underset{+}{GD}, \underset{-}{dY(t-1)})$$

This equation represents the investment expenditure undertaken by the government. It is assumed to depend on one year lagged private investment I(t-1) , foreign loans and grants FA, government deficit GD and one year lagged change in national income dY(t-1). I(t-1) and dY(t-1) try to capture the counter-cyclical tendency of government investment.

5. $$CH = CH(\underset{+}{Y}, \underset{+}{WH}, \underset{-}{P})$$

It represents the consumption expenditure of households. It depends on the income, wealth and the price level. It is assumed to depend on income Y, wealth holding of the public WH, and the price level P.

6. CG= total debt servicing + subsidies + defence expenditure + miscellaneous expenditure.

The government consumption is treated as an exogenous variable which is the sum of the above components (also exogenous). The consumption of the government is not determined within the system.

7. $X = X(P, e, S, Y^f, CIM)$

This is the export function and depends on the domestic price level P, exchange rate e, subsidies on exports S, foreign Income (that is that of major trading partners, Y^f) and the import of the capital and intermediate goods CIM.

8. $IM = IM(IC, Y, GD, e, PI, P)$

This is the import function of the economy and it depends on the import capacity IC which depends mainly on the foreign exchange position at any point of time , income Y, government deficit GD, exchange rate e, index of import prices PI, and the domestic price level P.

9. MS = MS(RC , FR , VEL3)

The money supply function is assumed to depend on the total outstanding RBI credit RC, unsterilised foreign reserves FR, and the velocity for broad money VEL3. RC and FR are taken separately to compare their relative importance.

10.MD = MD(Y , r , P)

The money demand function consists of income, interest rate, and price level. We do not introduce any speculative factor behind money demand due to the prevalence of capital controls and foreign exchange controls in India.

11. Y = Y(L , CIM , INF, YF)

This equation represents the supply side of the national product, which depends on the labour input L , import of capital products and intermediate products CIM, infrastructure investment INF and the foodgrains output YF.

12. $L = L^d (W/P) <= L^s (W/P)$

The labour input (= labour demand) is assumed to depend on the real wages.

13. $CIM = CIM^s (e, PI, P, IC,) <= CIM^d (e, PI, P)$

The demand for capital goods and intermediate goods imports depends on the exchange rate e , index of import prices PI, and the domestic price index P which reflects the demand pressure as well as the relative cost of a domestic substitute.

The supply of capital and intermediate imports depends on exchange rate e, price of imports PI, domestic price index P and import capacity IC

.

MODEL STRUCTURE

Y - [CH+CG+I+G+X-IM] = 0 } IS } aggregate
MD - MS = 0 } } LM } demand

Y - Y(L, CIM, INF, DM, M0) = 0 }agg. Supply

As far as the empirical work is concerned, we use the reduced form of the AS, AD, and BOP equations :

AD:$Y=F_1$ (P, WH, I_0, dY, CIM, DC, DE, Y^*, P_e, IC, e, P_i, M^s)

AS:Y=F2 (P, w, IC, PI, e, EN)

BOP:BP=F3 (Y, P, Y^*, e, PI, IC, Pe, DE, CI)

Our empirical work in chapter 5 would consist of the following steps:

1. Estimate the above three basic equations using 2SLS method using cointegration technique.
2. Using the estimated coefficients, we run simulations based on alternative policy formulations.

These estimation and simulation results underpin the evaluation of policy performance in the post-shock periods in the short-run as well as in the medium-run.

2. Estimation Results

In our reduced form model, we intend to estimate three equations, namely, the aggregate demand equation (AD), the aggregate supply equation (AS), and the

balance of payments equation (BP2). In estimating these equations, we have used a simplified cointegration technique. In applying this technique, we have ensured that all the variables that enter the equation have the same level of integration (integrated of order one). To do this, we have used the augmented Dickey-Fuller test for all the variables. In the estimation of this reduced form three-equation system, there will be simultaneity problems. To overcome this problem, we have used the TSLS method.

In the first step, we obtain the estimates of the coefficients in the three equations. The choice of the explanatory variables in the estimation of these three equations derives from the simple theoretical model that we have set up. But, all the variables in the theoretical model do not appear in the final estimated equation for the following reasons : (1) If we include all the variables appearing in the theoretical model, the estimated equations will become very cumbersome. In the presence of too many explanatory variables , the estimation will lose some of its meaning. (2) The variables whose coefficients have been found very insignificant can be omitted in the finally estimated equations.

In all these estimated equations, the first and second order autoregression have been controlled by introducing AR(1) and AR(2) variables.

Once we have estimated these equations, the results of which are presented below in a tabular form, we find that a majority of the coefficients have signs as expected theoretically. Let us examine the coefficients of all the three estimated equations.

Estimation of the AD Equation

TSLS // Dependent Variable is

D(P5)		
Independent Variables	Coefficient	T-Statistic
C	2.424607	1.017047
D(Y1A)	-0.000243	-0.820254
P3	0.047669	0.806333
D(MS6(-2))	0.046196	0.863002
D(E6)	0.238314	2.263745
D(YF)	0.013576	0.181728
D(GF1)	0.062666	1.038066
AR(1)	0.199440	0.730630
AR(2)	-0.278675	-0.940465
R-squared	0.762688	
Adjusted R-squared	0.636122	
Durbin-Watson stat	2.145469	

Here, P5 is the GDP deflator (price level), Y1a is the output at constant prices, P3 is the export price index , MS6 is the broad money supply, E6 is the subsidy adjusted real effective exchange rate (REERSA), YF is the foodgrain output, GF1 is the government deficit, AR(1) and AR(2) are the variables introduced to control the first order and second order auto regressions.

The coefficient of variable Y1a is negative which is expected for the aggregate demand function. The coefficient of the export price index is positive but insignificant. The coefficient of MS6(-2) is also positive but insignificant. This indicates the possibility that the expansion in money supply affects the price variable with a two year lag.

The D(E6) variable is positive and significant. Here E6 is the REERSA (expressed in dollar per rupee terms) is significant. This suggests that the years of depreciating REERSA have experienced a falling rate of inflation while periods of appreciating REERSA have been associated with a rising rate of inflation.

Theoretically, we expect a depreciation to raise the cost as well as the demand for the domestic good .But this is only the direct effect of deprecation /appreciation .An indirect effect is that an appreciating real exchange rate can sustained only by introducing physical restrictions on imports which again introduces serious cost disadvantages and which are more damaging to cost effectiveness. In the Indian case this indirect effect tends to dominate over the former as far as the effect on price level is concerned.

The foodgrains output growth is expected to influence the price variable negatively. But the coefficient of D(YF) is positive and insignificant. This indicates that the estimated AD equations fail to capture the effects of foodgrain output on the price variable. Food supply management has been an integral part of inflation control. Only when droughts follow in very quick succession that there is very severe strain on the price level as in period during and after the 1965-67 crises . So foodgrains shortage is potentially very damaging but if handled properly through timely imports its negative consequences can be contained to a large extent.

The change in government deficit (DGF1) also has a positive coefficient but is not significant.

Estimation of The AS Equation

TSLS // Dependent Variable is Y1A		
Independent Variables	Coefficient	T-Statistic
C	54316.43	2.594804
D(P5)	513.6447	0.382507
II(-1)	0.029236	-0.015066
D(IL4(-1))	1.422364	0.785035
D(YE)	420.2408	0.385424
YF(-1)	18.77810	0.062019
D(MS2)	138.5911	1.743037
TRE	1787.050	1.932035

AR(1)	0.005173	0.013004
AR(2)	-0.034808	-0.097552
R-squared	0.987632	
Adjusted R sq	0.981449	
D W stat	1.988190	

In the AS estimation, Y1A is the dependent variable. The coefficient of D(P5) is positive indicating a positive slope of the aggregate supply curve. The coefficient of D(IL4(-1)) i.e. a change in the one year lagged value of the foreign exchange reserves is positive. This is because the presence of comfortable foreign exchange reserves can ease the supply situation by enabling imports. If we directly use imports instead of D(IL4(-1)) the variable becomes significant but the autoregression becomes significant.

The coefficient of total electricity production (YE) is positive as it is a very important input into production. Even when we use deviations from trend of electricity production as an independent variable, the t-value of the variable improves only marginally.

The coefficient of foodgrain production YF(-1) is positive but insignificant. By observation of data, it appears that in the years of bad harvests, the non-foodgrain production has more than compensated.

The coefficient of change in domestic credit D(MS2) is positive indicating that the domestic credit situation reflects strongly on output. The coefficient of the trend variable TRE is positive.

Estimation of the BP Equation

TSLS // Dependent Variable is BP2		
Independent Variables	Coefficient	T-Statistic

D(E6)	-97.24368	-1.656579
D(P5)	-272.6333	-1.778877
P3	116.3386	2.346805
P4	-67.58375	-2.363956
YF(-1)	-20.00469	-1.402054
D(MS6)	-55.17510	-2.942023
AR(1)	-0.268664	-0.975547
AR(2)	-0.079371	-0.316816
R-squared	0.793187	
Adjusted R-squared	0.712759	
Durbin-Watson stat	1.908606	

The dependant variable is the trade balance BP2.The negative coefficient of D(E6) indicates that a deprecation of the REERSA improves the trade balance (it has a t value of 1.65).The coefficient of D(P5) is again negative indicating that domestic inflation affects negatively the trade balance . The export price index P3 affects the trade balance negatively. Both these independent variables are significant.

The one year lagged food output has a negative coefficient indicating that in majority of years the balance of trade has not been affected significantly by the shortfall in agricultural production .In fact the movement has been opposite in most years. There is a bit of asymmetry: the years of good foodgrain output are not necessarily associated with an improving trade balance, other factors like exchange rate ,domestic price level, monetary expansion and the export and import price index are more important.

The coefficient of D(MS6)is negative and significant indicating a BOP behaviour as indicated by the monetary approach .

Once we have estimated these equations empirically, we assume that the model is deterministic and use this model to simulate for alternative policy formulations particularly in the years following the economic shocks (in the next chapter). The artificial data that we generate is based on the post-facto observation of the policies adopted after the macroeconomic shocks. The actual data is modified artificially in the direction in which it was felt to be lacking.

APPENDIX (Estimation of other equations in the model)

ESTIMATION OF THE INVESTMENT FUNCTION (equation 3 of chapter 2)

LS // Dependent Variable is I

variable	Coefficient	T-Statistic
D(IA)	132.3554	1.646213
D(MS2(-1))	49.10151	1.025090
D(Y1)	31.44228	2.038740
IT3	5.867646	4.185247
AR(1)	0.285133	1.130531
R-squared	0.991513	
Adjusted R-squared	0.989815	
Durbin-Watson stat	1.731421	

Here, The dependent variable is I (investment). Independent variables are: IA is autonomous investment; MS2 is net domestic credit; r2 is the interest rate; IT3 is the import of capital and intermediate goods; and Y1 is the national income at current prices.

ESTIMATION OF THE PUBLIC INVESTMENT FUNCTION (equation 4 of chapter 2)

LS // Dependent Variable is IPUB

Variable	Coefficient	T-Statistic
C	-29.26543	-0.739982
D(IPRI(-1))	-0.110806	-1.400959
D(FL)	0.574188	3.421199
D(Y1A(-1))	0.000283	0.941459
AR(1)	1.394976	6.165617
AR(2)	-0.310627	-1.226180
R-squared	0.995659	
Adjusted R-squared	0.994574	
Durbin-Watson stat	1.704724	

Here, the dependent variable is IPUB (public investment). The independent variables are: IPRI is the private investment; FL is foreign loans and grants; Y1A is the GDP at constant prices.

ESTIMATION OF THE PRIVATE CONSUMPTION FUNCTION (equation 5 of chapter 2)

LS // Dependent Variable is D(CP1)

Variable	Coefficient	T-Statistic
Y1A	0.000423	5.888383
D(MS7)	0.003413	2.084601
D(P2)	-2.466742	-2.507107
AR(1)	-0.335518	-1.750700
R-squared	0.415884	
Adjusted R-squared	0.345791	
Durbin-Watson stat	2.056677	

Here, CP is the private consumption (dependent variable. The independent variables are : Y1A is the GDP at constant prices; MS7 is the wealth of the public; P2 is the consumer price index.

ESTIMATION OF THE EXPORT FUNCTION (equation 7 of chapter 2)

LS // Dependent Variable is D(IT1)

Variable	Coefficient	T-Statistic
P3	24.83708	0.421263
D(E6)	65.48010	0.318662
SUB	-22700.74	-0.413024
IT3(-1)	3.988533	2.348637
AR(1)	0.025303	0.081431
R-squared	0.649408	
Adjusted R-squared	0.566915	
Durbin-Watson stat	1.844999	

The dependent variable IT1 is the amount of exports. the independent variables are: P5 is the domestic price level; E6 is the real effective exchange rate; SUB ia the level of export subsidies; IT3 is the imports of capital and intermediate goods.

ESTIMATION OF THE IMPORT FUNCTION (equation 8 of chapter 2)

LS // Dependent Variable is D(IT2)

Variable	Coefficient	T-Statistic
D(Y1)	60.33187	1.574482
D(GF1)	-74.97149	-0.377729
D(E6)	389.1461	1.353079
P4	-52.93676	-0.430961
D(P5)	481.6597	0.675304
AR(1)	0.028271	0.105814
R-squared	0.572631	
Adjusted R-squared	0.470876	
Durbin-Watson stat	1.853109	

IT2 is the amount of imports (dependent variable). The independent variables are: Y1 is the GDP at current prices; GF1 is the government deficit; E6 is the real effective exchange rate; P4 is the import price index; P5 is the domestic price level.

ESTIMATION OF THE MONEY SUPPLY FUNCTION (equation 9 of chapter 2)

LS // Dependent Variable is D(MS6)

Variable	Coefficient	T-Statistic
D(MA2A)	2.085102	9.117647
MA1	0.228153	0.716236
MUL3	1.353371	0.429428
AR(1)	-0.371811	-1.999704

R-squared	0.903544
Adjusted R-squared	0.891969
Durbin-Watson stat	1.972576

MS6 is the broad money supply (dependent variable). The independent variables are: MA2A is the outstanding RBI credit; MA1 is the foreign exchange reserves; MUL3 is the multiplier for broad money.

ESTIMATION OF THE MONEY DEMAND FUNCTION (equation 10 of chapter 2)

LS // Dependent Variable is D(MD)

Variable	Coefficient	T-Statistic
D(Y1)	0.434151	8.393138
D(R4)	3.518875	0.216729
D(P5)	0.204900	0.174568
AR(1)	0.367070	1.553931

R-squared	0.917165
Adjusted R-squared	0.904739
Durbin-Watson stat	1.865393

The dependent variable MD is the money is the demand for money. The independent variables are: Y1 is the GDP at current prices; R4 is the interest rate in the money market; P5 is the domestic price level.

CHAPTER THREE

Shocks, Policy Response, and Simulations

1. THE INDIAN EXPERIENCE DURING THE CRISES

The Broad Indicators: A Comparison

Before discussing of the Indian experience during the shocks we will broadly outline the important macroeconomic conditions that prevailed in the period following the macro economic shocks. In this section, we give figures so as to compare the magnitude of different macroeconomic variables in the periods following the three crises. This briefly places the three periods on a comparative scale. The years mentioned stand for the fiscal year.

Monetary policy (Broad money supply) : The 1965-67 shock impinged on an economy which was not very liquid. The monetary expansion in 1963 and 1964 had been 8.8 percent and 10.2 percent respectively. In the years 1965 and 1966 the monetary expansion was 10.2 percent and 11.2 percent respectively. In the following three years it was 9.2 percent ,10.6 percent and 13.1 percent respectively. So we notice that in the period following this shock excessive expansion of money was avoided in all the years.

During and after the first oil shock, the expansion of money supply is far greater than that associated with the previous shock and also fluctuated widely. The shock impinged on a moderately liquid economy.(monetary expansion was 14.4 percent in 1971 and 16.3 percent in 1972). In the year 1973 the money supply was 9.8 percent. In the following two years it was 13.5 percent and 12.4 percent

respectively. In the next two years the money supply again soared. To 19.7 and 20.1 percent respectively.

The second oil shock impinged on a highly liquid economy (the money expansion was 20.1 percent and 20.3percent in the two years preceding the shock). In 1979 the money supply growth was again 20.2 percent .The subsequent three years indicate only a small slow down -16.3 percent ,17.3 percent and 14.3 percent respectively .

Fiscal policy : For comparison of fiscal policy during the three droughts we use government fiscal deficit (GF1) as a percentage of GDP at current prices .In the three years following 1965 ,the government deficit remained at an average of 4.9 percent and at around 2.9 percent in the subsequent two years. In 1973 and 1974 the government deficit remained at 2.7 and 3.2 percent respectively .In the following years it was 4.1 percent ,4.3 percent and 3.9 percent respectively.

In the years 1979and 1980 the government deficit was 5.5 percent and 6.5 percent .In the following three years it was 5.5, 6.0 and 6.4 percent respectively.

Inflation (of GDP Deflator) : The mid sixties crises impinged on an economy already experiencing high inflation rates(9.1 percent and 9 percent in the two years preceding 1965). The inflation rate as given by the GDP deflator was 9.3 in 1965 percent and in the subsequent years it was 13.4 percent ,7.8 percent and 13.7 percent.

The rate of inflation in 1973 and 1974 was 4.7 percent and 17.9 percent respectively as the oil shock continued to unfold itself. The year 1975 experienced negative inflation of -3.1 percent followed by 6.8 percent in 1976 and 3.4 percent in 1977.

Inflation of the consumer price index : The CPI inflation also shows a very similar pattern. The main difference is that during the first and second oil shocks the CPI inflation rate is lower than that of the GDP deflator .This difference is more pronounced for the second oil shock.

The balance of trade : The year 1965 was preceded by a trade deficit of 3.3 percent of GDP in 1963 and 4.3 percent of GDP in 1964. In 1965 the trade deficit was -4.13 percent of GDP. In the subsequent four years it was -3.1, -2.38, -1.03 and -.02 percent of GDP respectively.

The first oil shock impinged on an economy that was not running any significant balance of trade deficit due to the presence of import controls. The main impact of the balance of trade was in the year 1974 when it was -.93 percent of GDP. So the first oil shock did not present a very uncomfortable situation in terms of trade balance as compared to the previous shock.

The second oil shock plunged the trade balance to very deep levels: -1.71 percent of GDP in 1979 ,-3.53 percent in 1980 and -3.05 percent in 1981.In the subsequent two years it was -2.2 percent and -1.63 percent respectively.

So we find that the effect of the two oil shocks though similar in nature and magnitude ,their effect on the trade balance has not been similar. Two factors could be responsible for this :import restrictions and export volumes. Let us examine the movement of import volume and export volume in the period following the shocks.

As far as foreign exchange reserves are concerned, they are totally inadequate in comparison to trade deficit. The forex reserves are comfortably above the trade deficit in the period following the first oil shock. Except for 1979 and 1980, the foreign exchange reserves again turn very in adequate to balance the high trade deficit in the period following the second oil shock.

Percentage change in the export volume : In the year 1965 the export volume fell by 5.2 percent, in 1966 by 9.4 percent and by 10.7 percent in 1967. In the following two years it rose by 9.2 percent and 4.2 percent. So there is an indication of a fluctuating though stagnating export volume.

In the period following the first oil shock ,the export volume rose by 0.3 percent in 1973,12.3 percent in 1974 ,3.3 percent in 1975 and 29.2 percent in 1976.The export volume was rising even before the oil crises. The rate of growth of export volume fluctuated before the year 1973 as well as after it. But the fluctuation was around a higher rate after the shock.

After the second oil shock the export volume grew at 7.4 percent in 1979. but declined by 2.1 percent in 1980, before growing by 3.1 percent in 1981 and by 8.5 percent in 1982 and -2.4 percent in 1983.

Import volume : The imports volume index is a good indicator of import restrictions. In the two years preceding 1965 the volume of imports grew by -1.29 percent and

16.1 percent. The growth rate of import volume was -6.7 percent in 1965 , 23.3 in 1966 and -13.6 percent in 1967. In the following two years it was -7.32 and -13.92 respectively. So it is evident that imports were not only prevented from growing in volume ,they were drastically reduced in the period since1967.

Imports were restricted much less severely in the period following the first oil shock .In the four years starting with 1973 import volume grew 13 percent, 5.2 percent,1.9 percent and -8.97 percent. In 1977, it grew by 24.72 percent. So this is evidence that as the oil crises unfolded itself through 1973 and 1974 ,import restrictions were pressed into service and were relaxed after 1976 as BOP and reserves position became very favourable.

There is no evidence of intensification of import restrictions in the period following the second oil shock except in 1979 when import volume fell by 3.74 percent. In the subsequent three years import volume grew by 24.3 percent, 23.6 percent and 2.63 percent respectively.

Percentage change in food grains output : The year 1965 was preceded by complete stagnation and even falling output of food grains. In the years starting 1962 the percentage increase in foodgrains output were 0.1 percent ,-2.4 percent and 0.4 percent respectively. In 1965 it rose by 10.7 percent above this low base but again declined by 19 percent in 1966. In the following years the rate of growth was 2.6 percent .2.8 percent and -1.1 percent respectively.

The first oil shock was preceded by a fall in food grains output by 3 percent in 1972. In 1973 the output fell by 7.7 percent and rose by 7.8 percent in the next year

In the subsequent three years ,the food grain output growth rate was -4.6 percent ,21.2 percent and -8.1 percent.

The second oil shock followed after a year of good harvest in 1978 when food grain output grew by 13.7 percent. In 1979 it grew by 4.3 percent and fell 16.8 percent in 1980 but there was a small food grain export in 1980. In the following two years it grew by 2.5 percent and -2.9 percent respectively. So in the immediate follow up to the second oil shock the food grain production was not so precariously placed as in the previous two crises. The comfortable foreign exchange situation during this shock was another added advantage.

Foodgrain imports : Food grain imports are closely related with the food grain output (exponentially smoothened). Food grain imports were 7.4 million tonnes in 1965 .In the following three years these were 10.3, 8.7 and 5.7 million tonnes respectively.. In the four years starting with 1973 the food imports were 3.59, 5.16, 7.54 and 6.92 million tonnes respectively.

In 1979 and 1980 the net food imports were -.2 million tonnes and -.34 million tonnes in the following two years these were 1.66 and 1.58 million tonnes.

Public Investment : Public GFCF consistently fell between 1965 and 1970 from 8.5 percent of GDP to 5.6 percent of GDP. In the two years starting from 1973, the public GFCF as a percentage of GDP showed some recovery and was respectively 7.7 percent and 7.6 percent; subsequently it increased even more being 9.6 percent in 1976 and 10.1 percent in 1977.

In the four years starting 1979 the public GFCF was respectively 10.3 percent,8.7 percent ,10.5 percent,11.3 percent as a percentage of GDP.

The reliance on foreign financing of the government deficit was heaviest during the sixties shock (more than two percent of GDP)..The reliance on foreign borrowing is almost similar in the two oil crises (around 1 percent of GDP).

After the second oil shock, the pattern as well as magnitude of government borrowings was different from the earlier one. While in the late sixties, the government domestic borrowings averaged between 2-3 percent of GDP, it was around 3 percent of GDP in the mid seventies but increased to around 5.5 percent of GDP during the period following the second oil shock.

Borrowings from the RBI also show a similar pattern increasing sharply after the second oil shock. In the four years starting 1965 these were respectively 1.4, 0.4, 0.5, and 0.9 percent of GDP. In the four years starting 1973, these were respectively 1.2, 0.5, 0.2 and 0.3 percent of GDP. In the four years starting 1979 it was respectively 2.6, 2.6, 2.5 and 1.3 percent of GDP.

The 1965-67 crisis

This crisis was precipitated by two successive droughts in 1965-66 and1966-67, agricultural value added falling by 13.5 and 1.7 percent respectively. Slow growth of agricultural output and of exports and the unwillingness to moderate the investment programmes of the third plan, resulted in a balance of payments imbalance. This was sought to be controlled through severe import restrictions which also hampered production and imports. The war with China in 1962 made matters even worse. Agricultural production was virtually flat between 1960-61 and 1963-64. Between 1960-61 and 1967-68, the growth rate of agricultural production was only

1.2 percent, well below the population growth rate. The dollar value of exports rose at the rate of 4.2 percent. Public investment grew rapidly at a rate of 11.2 percent between 1961-62 and 1965-66 to reach a peak of 9.6 percent of GDP. The government consumption expenditure rose from 6.7 to 8.9 percent mainly because of an increase in defence expenditure from 2 to 4 percent of GDP between 1960-61 to 1963-64. The consolidated government fiscal deficit rose from 5.6 percent of GDP (1960-61) to 6.7 percent of GDP(1965-66). Inflation measured by the WPI rose from imperceptible levels at the beginning of the decade to 11 percent in 1964-65. Foodgrain prices rose by 20 percent that year even while the output jumped. Foodgrain inflation moderated to 6 percent in 1965-66 but shot up to 18 percent and 25 percent in the following two years.

Policy response: (Devaluation-liberalisation package, Management of food supplies, Conventional demand management)

The devaluation package was negotiated even before the onset of the crisis. The package was agreed to on the understanding that $900 million of non-project aid would be provided, apparently for several years, 1966-67 onwards. But, the authorisations as well as disbursements fell short of this agreed figure.

The main plank of food policy in the famine affected states such as Bihar was free feeding programs, though public works also played their part. The movement of food from surplus to deficit states was hampered by the existence of food zones. Since public procurement in the surplus states fell with the drought, the transfer of food to states like Bihar depended on the convoying of food by imports through

official agencies. This process of convoying food through official agencies was fraught with difficulties.

The presence of demand pressure was recognised and the 1965-66 budget envisaged a small surplus which could not be achieved. Real public sector investment rose by 5.2 percent , and real government consumption by 9.7 percent. This was against a background of a fall in real GDP of 3.7 percent. The government fiscal deficit rose to 6.7 percent of GDP. WPI(march 1965 - march 1966) rose to 11.5 percent, while the food situation remained grim. In 1966-67, the kharif crop was bad again. Public investment fell by 13 percent in real terms while public consumption did not come down. WPI and CPI both rose by about 14 percent. In the new budget by Morarji Desai, the balancing act was done mainly by keeping the plan expenditure in check. 1967 saw a bumper kharif crop, real GDP rose by 8.2 percent while real agricultural GDP rose by 17 percent. Nominal government expenditure rose by only 1.2 percent. This seems to be an overkill.

The nominal devaluation of June 1966 was huge(36.5 percent in rupee/ dollar terms), but as it was accompanied by a reduction in tariffs and export subsidies, the real devaluation was much less. In 1966-67, agriculture based exports naturally suffered but chemical and engineering exports also suffered because the effective exchange rates for these goods revalued. The BOP situation improved later because the food imports and capital goods imports for the public sector had declined.

The 1973-75 crisis

The balance of payments started declining in October 1973 as prices of imported commodities rose, especially oil and wheat. The terms of trade worsened by 40 percent between 1972-73 and 1975-76. The current account deficit deteriorated from $455 million in 1972-73 to $951 million in 1974-75. This was against a background of domestically caused inflation in the preceding three years resulting from a reduction in foreign aid, Bangladesh war, and the two droughts of 1972-73 and 1974-75. The unskilful food supply management of the government by attempting to nationalise wholesale trade in foodgrains was also responsible for the inflation. The fiscal policy tended to spill over into monetary expansion resulting from the burden of war and refugees, food subsidies and drought relief. Capital expenditure also grew as the post-1966 stagnation in investment was reversed. Revenue receipts rose from 14.6 percent of GDP in 1970-71 to 16.3 percent in 1973-74 but expenditures grew faster and the consolidated government deficit increased by about 1.4 percent points of GDP. Due to dwindling foreign aid, the degree of monetisation of the fiscal deficit was greater.

In 1972-73, the balance of payments had shown some improvement inspite of falling aid. As the current account deficit fell to $455 million (16 percent of imports). But by 1974-75, the current account deficit had deteriorated to 21 percent of exports, mainly due to a deterioration in the terms of trade.

Policy response: The government response to inflation did not come until 1973-74 though there were clear danger signals towards the end of 1972. But starting in mid

1974, the government took tough fiscal and income policy measures. The measures included:

- increase in excise duties on a wide range of goods, including petroleum products.
- administered prices were increased.
- organised sector salaries/wages were frozen.
- dividend distributions were limited to 33 percent.
- bank rate was raised from 7 to 9 percent. minimum lending rates were raised from 11 to 12.5 percent.

margin requirements against bank advances were raised sharply.

a tax of 7 percent was imposed on the interest income of commercial banks.

The speed of reaction of the above anti inflation policy was too fast to be believed. While the package was undertaken in mid 1974, prices began to fall only two months later and continued to do so.

The BOP deficit was initially financed partly by external finance and partly by loans. Growing remittances from workers abroad also eased the BOP pressure, partly in response to government measures to attract more remittances and non-resident deposits. Import controls were tightened and measures were taken to restrain the consumption of petroleum. The overall growth of imports was negative. Exports increased fast as the demand restraint at home kept the pull of the domestic market low. But the most important factor appears to be the effective depreciation of the rupee resulting from pegging to the pound sterling in the period December 1971 to September 1975 and later the multi-currency peg with undisclosed weights. The

negative domestic inflation reinforced the real depreciation of the rupee. This tactic of devaluation vis a vis competitors because of the peg with the weak currency sterling was especially important as overt devaluation was seen with extreme hostility due to the earlier experience with the 1966 devaluation.

The 1979-81 crisis

This crisis was associated with a sharp increase in oil prices and a severe drought in 1979-80 that affected both kharif and rabi crops resulting in a 17.6 percent drop in foodgrains production. Though the government did not falter much in the management of food supplies, the supplies of edible oils, sugar and raw materials were not managed efficiently despite the comfortable foreign exchange position. As regards infrastructure, there is a suggestion of a chronic supply side failure - growing shortage inspite of increase in installed capacity. Capacity was increasingly under-utilised due to an insufficient coal supply and its bad quality. The insufficient supply was due to bottlenecks in railway transportation. Fiscal policy in the later half of the 1970s was also relaxed and the most visible component was the increase in explicit subsidies which increased by nearly 1 percent of GDP. The situation got more alarming in 1978 and 1979 (when fiscal deficit grew to more than 6 percent of GDP). Money supply was fuelled by BOP surpluses until 1977-78 and thereafter by increased government borrowing from the RBI. There were some restrictive monetary policy measures but these were mild, and banks were able to exploit the loopholes to nullify the intent of these policies.

Deterioration in the BOP in 1979 and 1980 was caused mainly by a terms of trade shock. But it was different from the shock in 1973 in that the prices of imports other than petroleum increased only moderately and imports had been growing rapidly for two years before the oil shock, because of some liberalisation of import of intermediate and capital goods. The import liberalisation policies were not reversed after the terms of trade shock. In 1979-80 and 1980-81, the trade balance deteriorated by more than $5 billion, as the price of a barrel of oil rose from $13 to $34 by march 1981. The terms of trade deterioration, however, was only 20 percent since the price of non-oil imports did not rise and export prices rose to some extent. Oil imports in these two years rose by 30 percent in volume and more than trebled in dollar terms. Public investment in this period was more import intensive and played some role in the worsening of trade account. Remittances cushioned the effect of the rise in the trade deficit. The current account deficit kept increasing (from $997 million in 1979-80 i.e. 10 percent of imports it reached $2.7 billion in 1980-81 i.e. 20 percent of imports) . The deficit was financed by an increase in grants and loans from international agencies. The magnitude of the shock can be gauged from the fact that the current account deficit changed from 0.3 percent of GDP (4 percent of exports) in 1978-79 to 2 percent of GDP (31 percent of exports) in 1981-82.

1979-80 and 1980-81 were crisis years manifesting both high inflation and high current account deficits. The government response to inflation emphasised more food supply management and less conventional monetary and fiscal policies. In august 1981, inflation stopped in its tracks. The large accumulation of foreign exchange reserves before the crisis enabled the authorities to avoid tightening of

import controls in response to the current account deficits. The high inflation of the two crisis years influenced the competitiveness of exports as the nominal effective exchange rate remained steady. This and the world recession slowed down the export growth. In 1981-82, the current account deficit was 31 percent of exports - higher than in the previous two years. A loan of SDR 5 billion was approved by the IMF in November 1981, payable in three instalments: SDR 900 million by June 1982; SDR 1.8 billion by June 1983; and the balance by November 1984.

Fiscal and monetary policy were non-accommodating and fluctuated in terms of toughness. Starting in July 1979, the loopholes leading to non-adherence to CRR were closed but the incremental CRR of 10 percent imposed in 1977 was relaxed due to concerns about recession. However, the CRR was raised from 6.5 percent in July 1981 to 7.75 percent in January 1982 and SLR from 34 to 35 percent in July 1981. Reserve money also began falling sharply as the public's currency holding was reduced. The growth rate of M1 fell sharply from mid 1981 to mid 1982.

The consolidated government fiscal deficit went up from 5.7 percent of GDP in 1978-79 to 6.5 percent in 1979-80 to 8.1 percent in 1980-81. The budget of 1981 was very tough because of the worries about the continuing inflation and partly in anticipation of the IMF program. Excise, custom duties, and administered prices were raised and the fiscal deficit came down to 6.7 percent of the GDP.

In 1979-80, the WPI rose by 17 percent mainly due to an increase in the price of manufactures. In the following year too the price of manufactures rose and the rate of inflation was only slightly lower.

Evaluation of policy during the three crises

Regarding the response to the 1965-67 crisis, the most important issue that arises is the Justification of adopting a deflationary policy when prices rose due to a fall in agricultural output. Due to the low price elasticity of foodgrains, can a deflationary policy be expected to limit inflation? At the same time, a deflationary policy can cause havoc to industrial output. More importantly, it delays the recovery even after the agricultural shock has passed. A dampened growth rate of output also erodes competitiveness as a lower rate of investment also means a slower improvement in technology. If the deflation was aimed at lowering purchasing power, there is no valid rationale behind cutting public investment. A much more direct step would have been direct taxation of incomes. But this measure was not undertaken until the1974 crackdown.

The quick recovery after the 1973-75 shock was not unaccompanied by policy mistakes. There was a mismanagement of food supplies and an over-expansionary monetary policy in 1973 and again after 1975. The growth of remittances from the middle east provided enough leverage to the government to ride out the drought and wait for an agricultural recovery rather than attempt to nationalise wholesale trade in foodgrains. However, most aspects of policy response were very appropriate, particularly the exchange rate management and oil saving. The volume of imports were allowed to grow at a much slower rate than exports.

The response to the crisis of 1979-80 was very different from that in 1973-74 though the origins of the two crises were very similar. The position as regards food and

foreign exchange was extremely favourable in 1979-80. The principal defect of the macroeconomic response was the explosion in the government's current expenditure. This was the major reason behind the rapid accumulation of internal and external debt. The exchange rate management during this period was inappropriate. The stagnation in the real exchange rate was the root behind the stagnation of non-oil exports in the first half of 1980s. lack of structural adjustment also led to inefficient utilisation of resources including foreign borrowing.

2. SIMULATIONS

we now consider whether a different response might have given a better result in the period of stabilisation. The simulations facilitate a comparison between the actual policies undertaken after the shocks and the modified policies represented by the simulations. We make the following modifications:

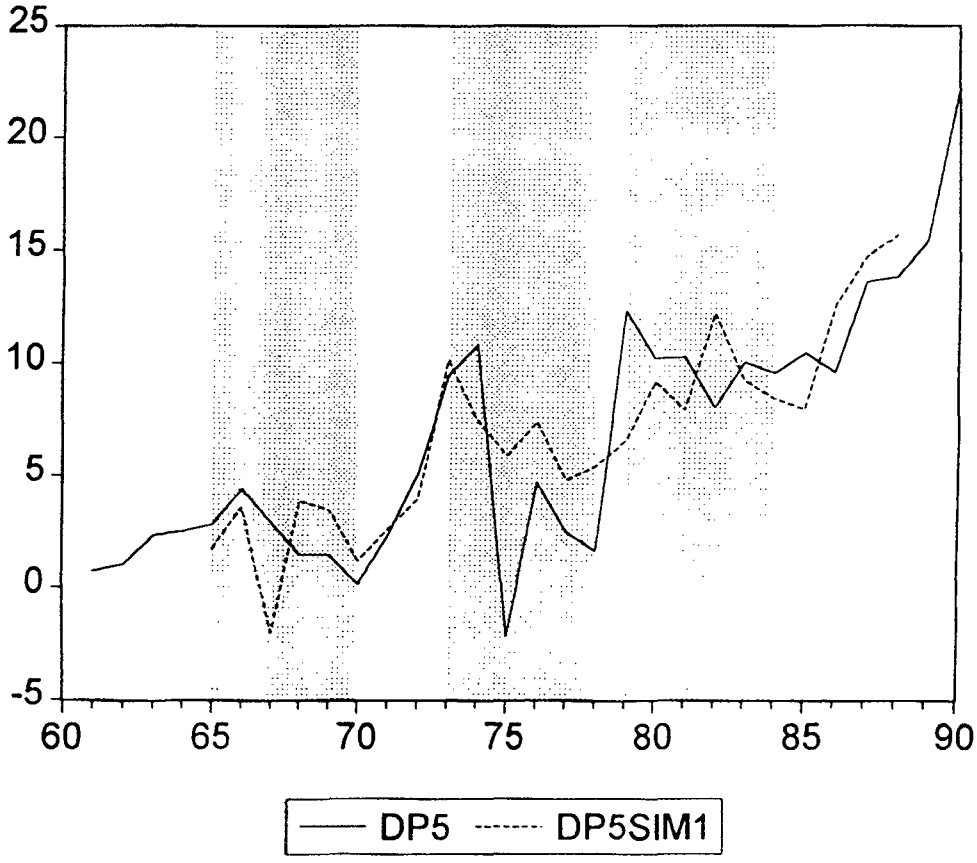
- In the period following 1965 we maintain the government deficit at a level of 4 percent of the GDP till 1969. We do not disturb the fiscal policy following the first oil shock. Again between 1980 and 1983 we reduce the fiscal deficit marginally.
- As far as monetary policy is concerned, we try to smooth out the monetary fluctuations in the period following the shocks. We also reduce the rate of monetary expansion in the period following the second oil shock and also some years preceding it.
- As far as the exchange rate policy is concerned, we adjust the REERSA such that the change in REERSA i.e. D(E6) is assumed to be zero in all the years when it

actually appreciates. The D(E6) is not altered in the years when the rupee depreciates.

A. when all three policy variables are modified

Simulation of D(P5)

The simulated price change (graph DP5 DP5SIM1) during 1965-67 shock and the 1979-80 shock is better than the actual price performance. The simulated price change during the 1973-74 shock is not decisively better than the actual price performance

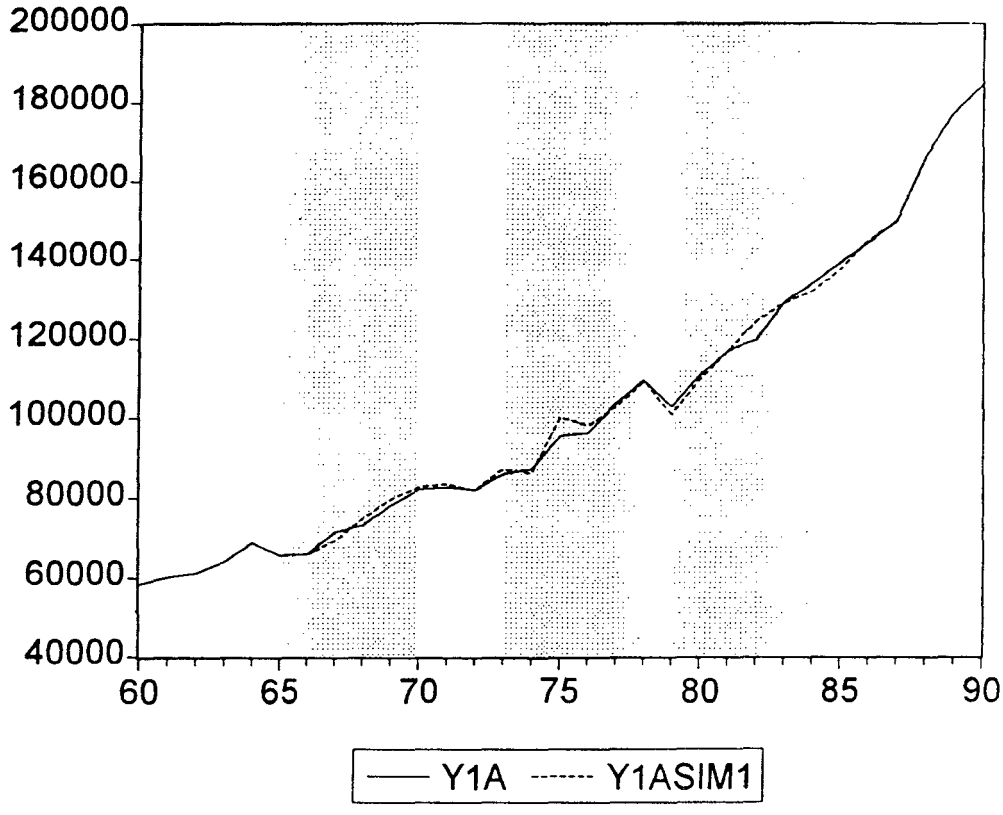


In the years 1965, 1966 and 1967, the simulated price change is lower than the one actually experienced. In the years 1968 to 1970, the simulated price change is higher than actual.

In the 1973 to 1978 period, the simulated price change performs better only in the year 1974. However, it is less fluctuating than the actual price change.

The better performance of the simulated price change in the years 1979,1980 and 1981 is the effect of lower monetary expansion in the years 1977, 1978 and 1979 in the simulations. This is also the effect of assuming zero appreciation in the years 1979, 1980 and 1981.

Simulation of Y1A



The graph (Y1A Y1ASIM) plots the actual and simulated real output. In the years 1965 to 1970, the simulated output is marginally lower than actual output in the year 1967while it is marginally higher in the other years.

The simulated output is higher than the actual output in all the years from 1973 to 1976.

During the 1979 to 1984 period, the simulated output performs better only in 1982.

We find that in our simulations, output is not altered by the modifications we have made. Improvement of output would come about only in the medium run as the structure of the economy improves due to better policy orientation. But, these

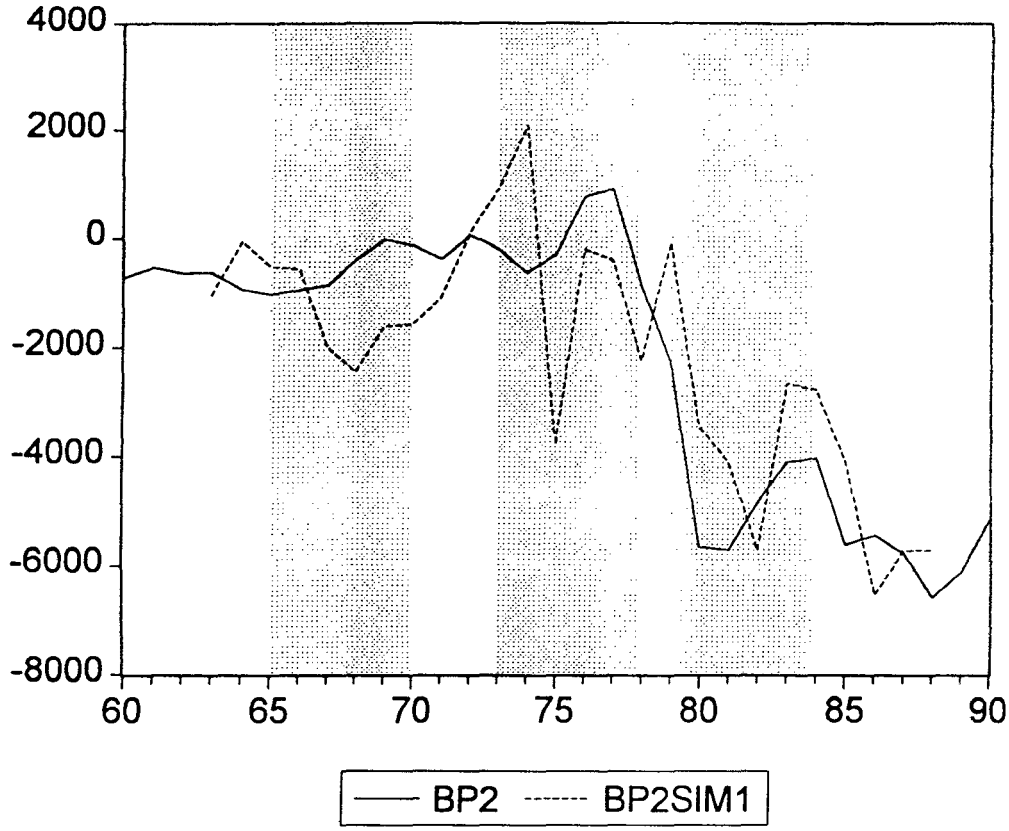
medium run effects which work through the altered structure of the economy are not captured as we work with the estimated coefficients.

Simulation of BP2 All the three crises were most delicate on the balance of payments front. The simulations that we run also point that the balance of trade is sensitive to the policy variables we have modified in the simulations.

During the 1965 to 1970 period, the simulated trade deficit is lower in 1965 and 1966 and higher in the other years.

During the 1973 to 1978 period, the trade deficit is lower in 1973 and 1974 and higher in the other years. During the 1979 to 1984 period, the trade deficit is lower.

The simulated trade balance is higher than the actual in all the years when trade balance was not so comfortable.



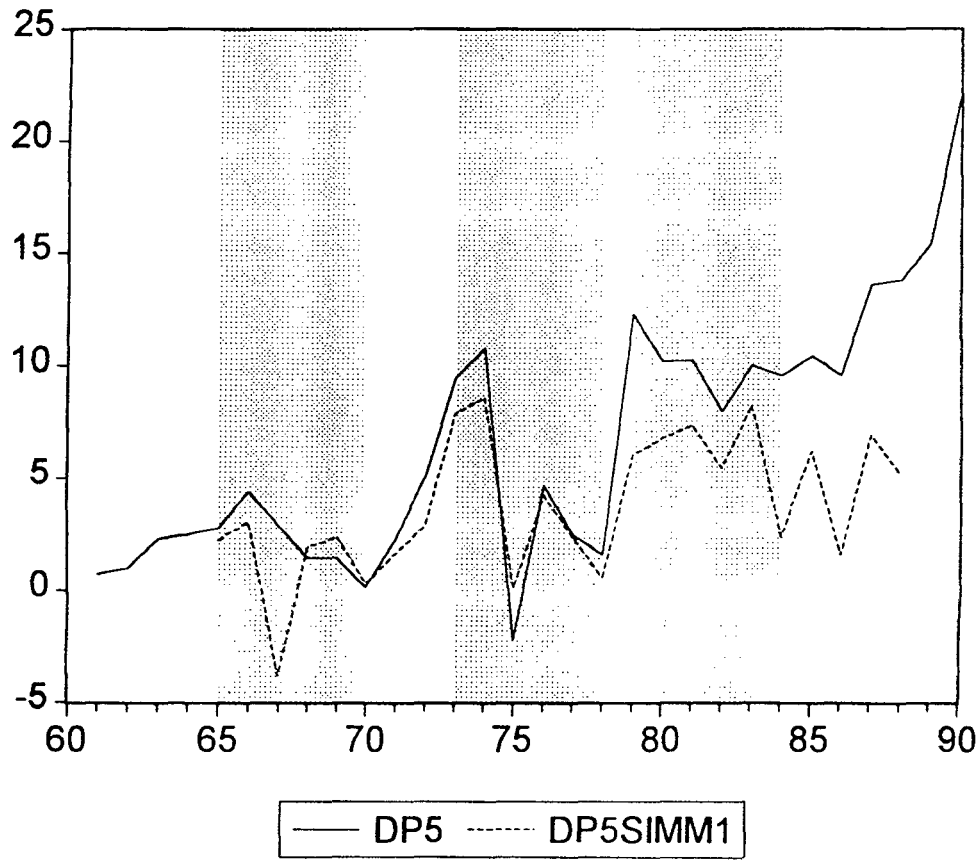
The simulation does not perform better in all the years. The possible reason for this may be that :

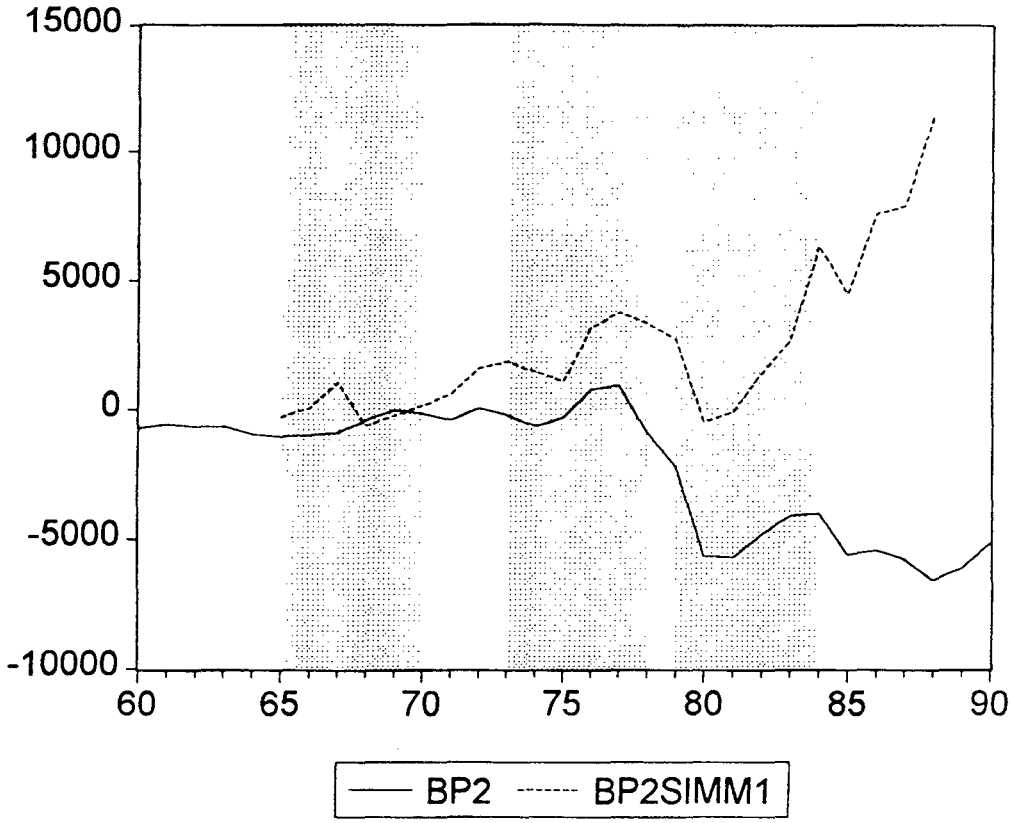
- The changes that we have made in the generated data are small and that too for very few select years.
- In the case of simulated BP2, the indirect effect through price level is also very significant and modifies the effect of the alternative policies.
- All the modifications do not modify the simulated variables in the same direction in all the periods
- The simulation is static and deterministic and does not carry over the effects of beneficial policies dynamically

In the above simulation, we vary all the three policy variables i.e. monetary policy, fiscal policy and exchange rate policy. In the following simulations of price change and trade balance, we vary only one of the policy variables instead of all three. The modification of each policy variable is same as before.

B. When only monetary policy is modified

In this simulation, the price performance improves very significantly especially in the period following the second oil shock (graph DP5 DP5SIMM1). The balance of payments also shows drastic improvement for all the periods (graph BP2 BP2SIMM1).




15000
10000
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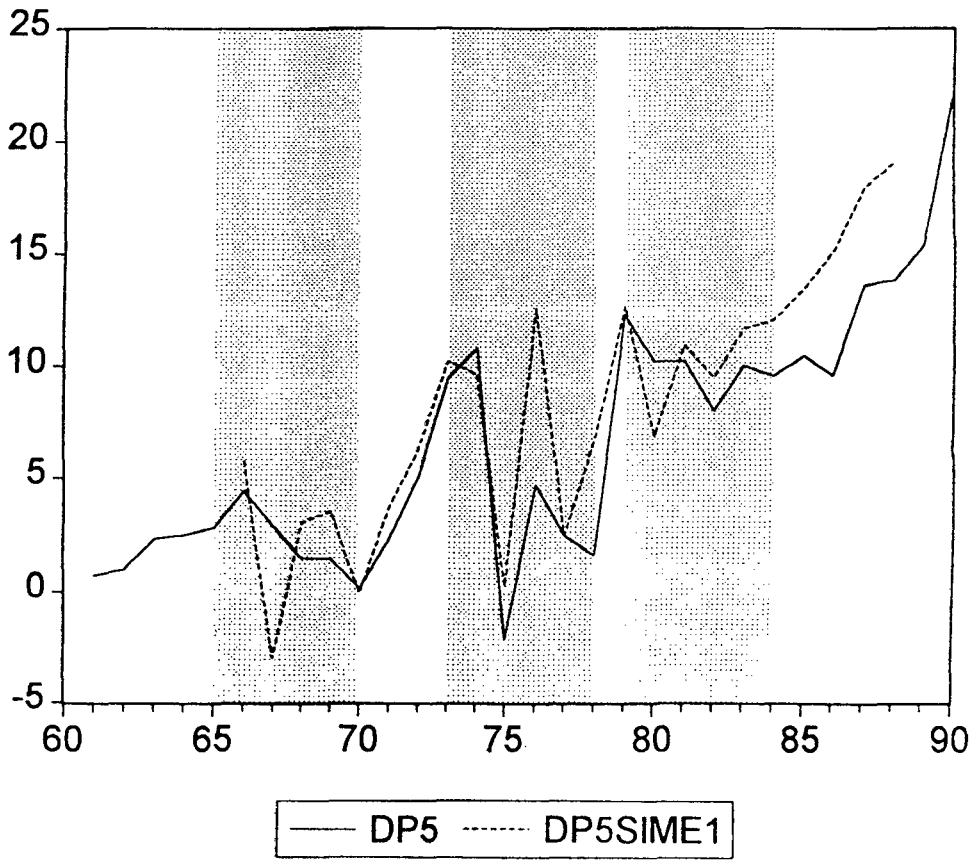
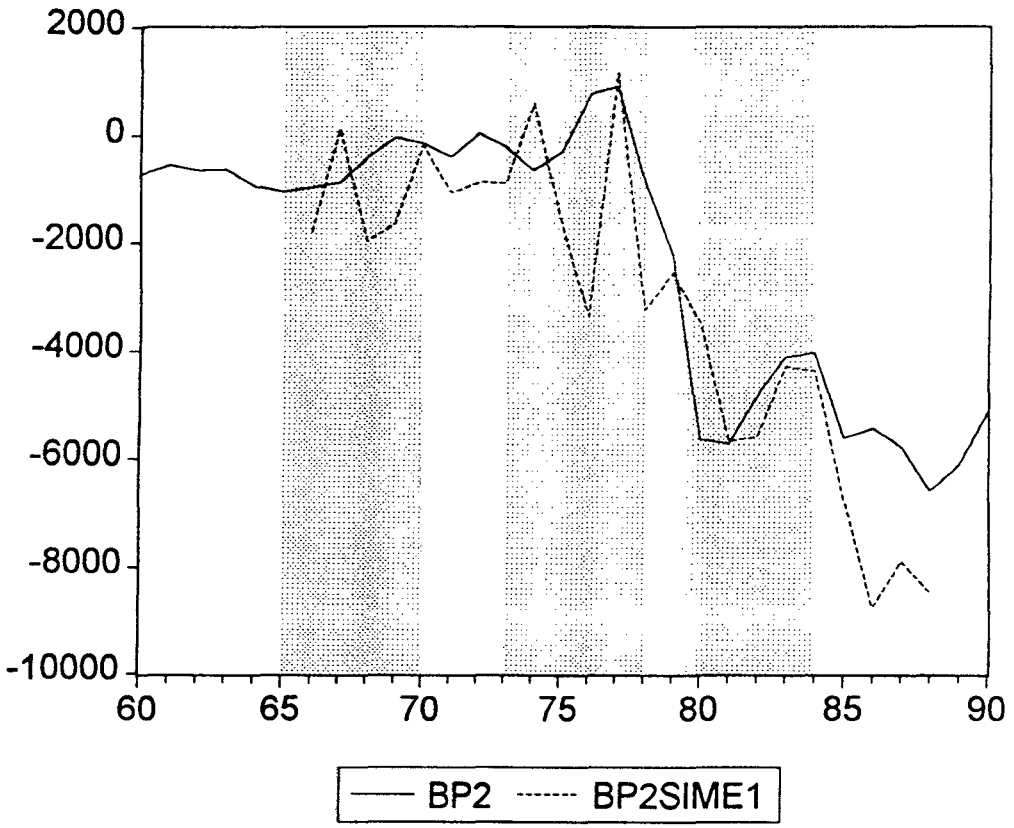
BP2
BP2SIMM1

C. When only D(E6) is modified

When we only modify D(E6) i.e. the REERSA, the simulated price performance is better in 1966, during 1975 to 1979 and 1981 to 1984 (graph DP5 DP5SIME1). The simulated trade balance during this period does not significantly improve over the actual (graph BP2 BP2SIME1). The possible reason for this may be that the effect on the balance of payments through monetary policy, exchange rate policy and price (indirectly) are very tangled. Also, the modification of D(E6) is so minor that the effect on BOP due to it is not strong. However, the REERSA would be modified further if we

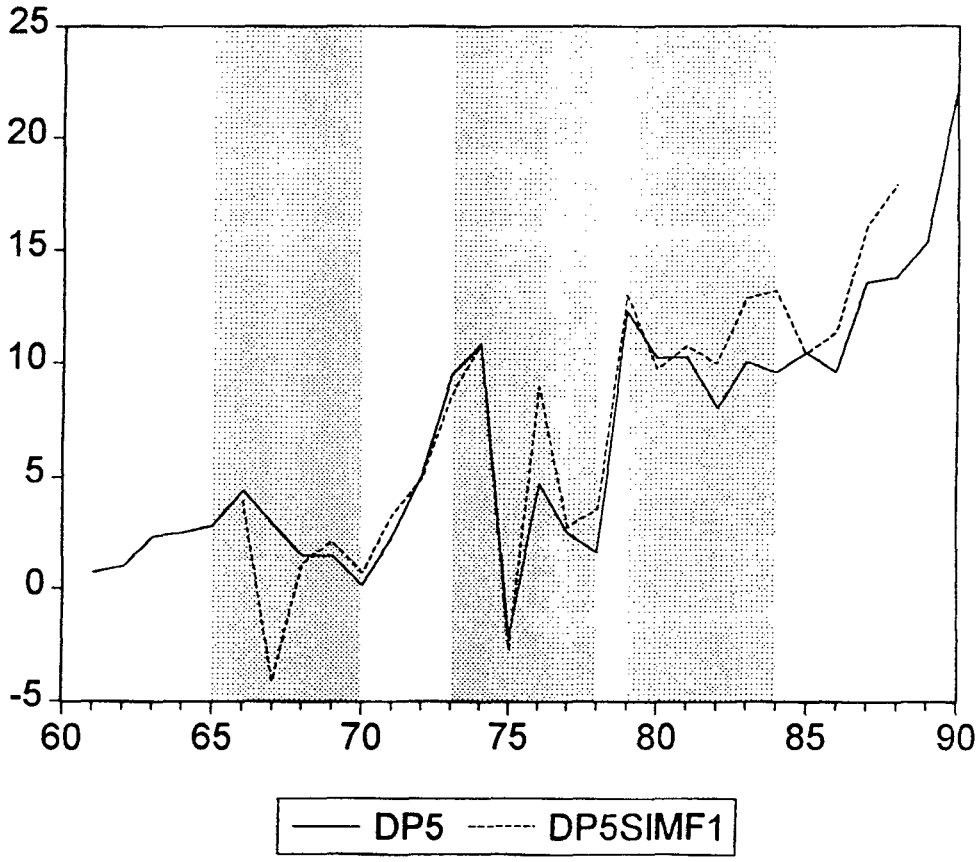


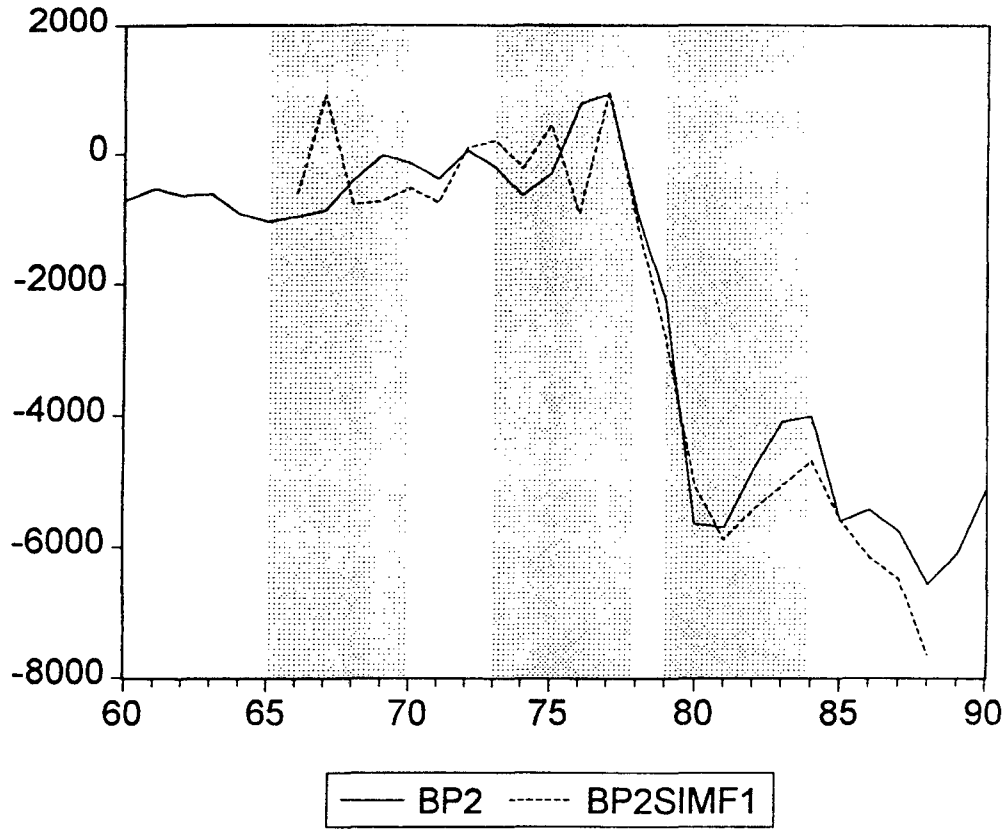
consider the effect of restrained monetary expansion (which works via the domestic price level). if this effect is considered in the simulation, the effect of REERSA on trade balance would be enhanced. In this sense, the price variable and the money supply variable in the estimated BP2 equation absorb the effect of the REERSA.



4. When only D(GF1) is modified

When we vary only fiscal policy, the simulated price change is lower during the years 1975 to 1978 and 1981 to 1985 (graph DP5 DP5SIMF1). In this simulation the simulated trade balance doesn't perform better (graph BP2 BP2SIMF1).





These simulation exercises point towards an important conclusion: the effect of domestic price variable on the trade balance is very important and a low level of domestic inflation is very important. Export subsidies and nominal depreciation cannot completely substitute a low domestic inflation. Next In importance to low domestic inflation is nominal depreciation.

APPENDIX (Estimation of coefficients used to generate the non- policy variables)

For the simulations we generate artificial data for GF1, MS6, E6 as outlined in the chapter 3. But these variables also affect the dependent variables IL4, MS6, MS2 and I. So in the final simulation, we use the simulated values of these dependent variables. We use the coefficients of the following estimations in generating the dependent variables IL4, MS6, MS2 and I using the artificial data for the three policy variables.

LS // Dependent Variable is I

Variable	Coefficient	T-Statistic
C	1759.183	2.628605
D(GF1)	146.9304	2.368283
D(MS6)	352.9311	24.19094
AR(1)	0.435345	1.560621
AR(2)	-0.916057	-2.612781
R-squared	0.985553	
Adjusted R-squared	0.983331	
Durbin-Watson stat	2.110806	

LS // Dependent Variable is D(IL4)

Variable	Coefficient	T-Statistic
D(E6)	4.908581	0.300567
I	-0.050026	-1.759222
P4	-15.67676	-0.971344
P3	29.41319	1.647674
AR(1)	0.745009	3.122352
AR(2)	-0.412188	-1.702430
R-squared	0.487322	
Adjusted R-squared	0.359153	
Durbin-Watson stat	1.987168	

LS // Dependent Variable is D(MS2)

Variable	Coefficient	T-Statistic
D(MS6)	1.114229	25.43689
D(GF1)	-0.546609	-2.690621
D(E6)	0.295478	1.038076
AR(1)	0.268135	1.208282
AR(2)	-0.020932	-0.093358
R-squared	0.989864	
Adjusted R-squared	0.987933	
Durbin-Watson stat	2.010072	

LS // Dependent Variable is D(MS6)

Variable	Coefficient	T-Statistic
D(GF1)	0.089152	0.856662
GFFOR	-1.482057	-0.708588
GFDOM	-0.308318	-0.205032
AR(1)	0.122056	0.800715
AR(2)	1.205490	6.554766

R-squared	0.992409
Adjusted R-squared	0.991088
Durbin-Watson stat	1.980509

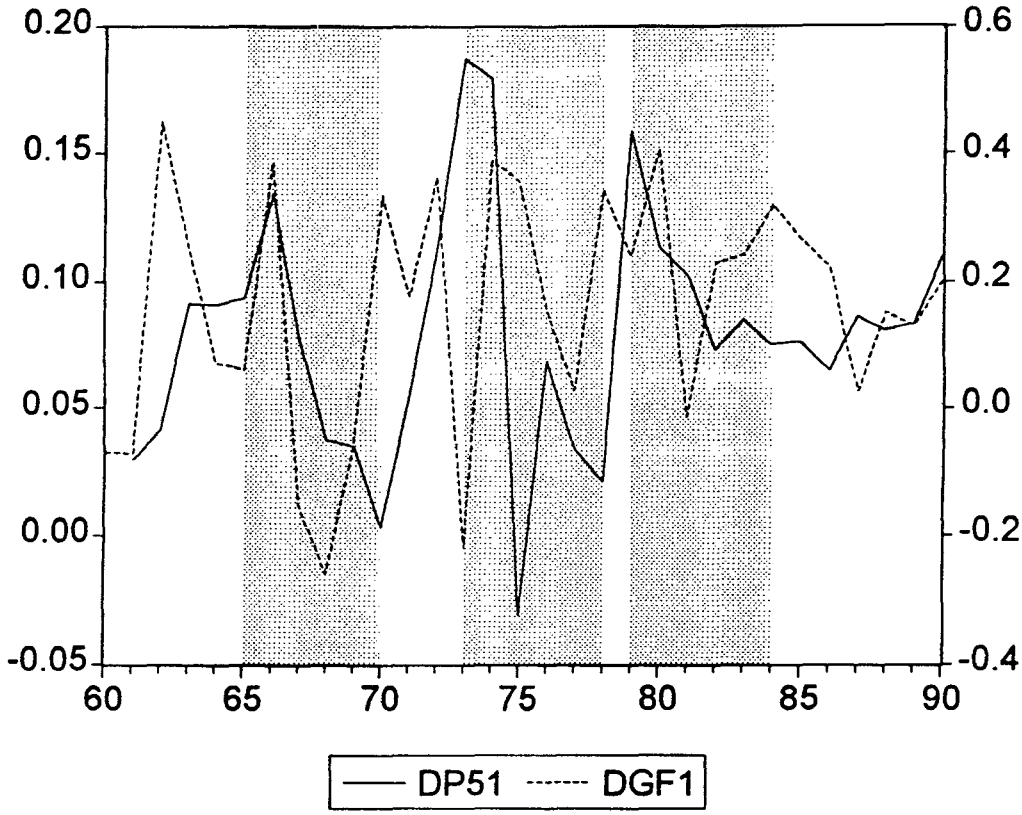
3. A GENERAL DISCUSSION

Fiscal policy: Little and Joshi[2] conjecture that the fiscal deficit cannot be emphasised as an indicator of fiscal stance since it is itself endogenous. They emphasise that if fiscal policy is to be output stabilising, then the fiscal impulse (cyclically adjusted) should be positive when output is below trend and vice versa. In India, the main concern of the authorities has been inflation and fiscal impulse has been negative in the years following the crises. This contractionary policy on the part of the authorities implicitly assumes that the inflation is solely due to factors operating from the aggregate demand side. This assumption, especially in the period following the shocks is of very doubtful validity.

The aggregate demand equation that we have estimated shows a moderately positive relationship between the fiscal deficit and the rate of inflation. This strongly suggests that a positive fiscal impulse even in a high inflation year is not likely to be dangerous if the inflation has its roots in the supply side of the economy or is due to exogenous factors. If the price increase in the economy follows from supply side failures, then if a part of government expenditure which aims at relieving these bottlenecks would only ease the price situation rather than intensify it. In the case of Indian fiscal policy, there have been twofold mistakes: firstly, the supply side management of inflation has unnecessarily been accompanied by uneven fiscal contraction. Secondly this fiscal contraction has tended to destabilise investment

[2] Joshi, V. and Little, I.M.D., *India: Macroeconomics and Political Economy*. New Delhi: Oxford University Press,1994

which may lead to breaks in the growth of industrial output and result in a mild recession. In the graph (DP5 DGF1) the solid curve represents the proportional



increase in the government deficit and the broken curve shows the percentage change of the GDP deflator. The observation of this figure reveals only a weak relationship between the government deficit and the price level. So this suggests a need for avoiding unsustainable levels of the government deficit rather than using the government deficit as an instrument to stabilise the price level in the short-run.

One immediate effect of an increased fiscal deficit would be a widening of the current account deficit which has a chance of becoming unsustainable in the longrun if fiscal deficit does not acknowledge the BOP situation. This follows from the often

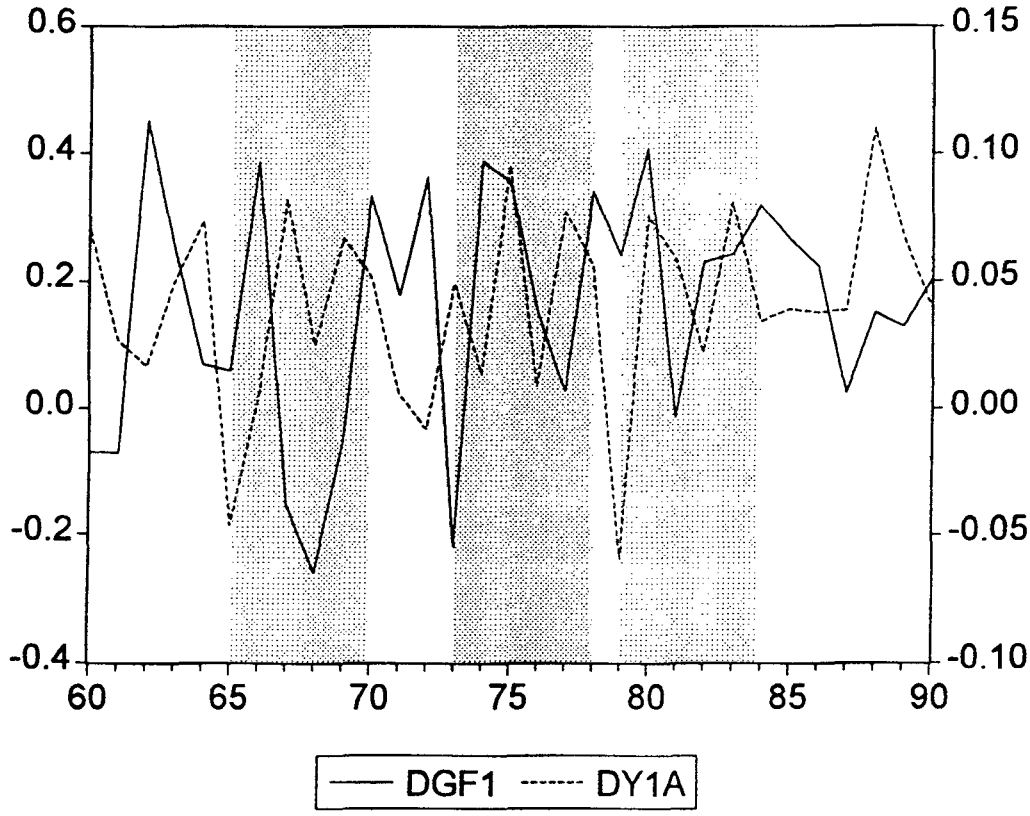
used gap models where a mismatch between savings and investments spills over as BOP deficits. The crisis of 1990-91 has been attributed to this phenomenon. But one important point should not be missed: The endogeniety of fiscal deficits in India is largely determined by the supply side considerations in which the public sector has had a substantial role to play. On the supply side the inefficiency of investment and of other government expenditure has been a bigger culprit than the magnitude of the deficits. While on the one hand the inefficiency (managerial) of government expenditure tends to inflate the fiscal deficits substantially, it also affects public savings inversely.

Another important question is the relationship of the fiscal deficit to the total output of the economy. The following figure (DGF1 DY1A) would give some insights into this issue. Even in the years when the economy is not subject to the strain of external shocks, the rate of growth of real output has not responded consistently to higher levels of fiscal deficits. Response to the shock in the form of a quick cut in the fiscal deficit is strongest in the period following the first oil shock when it contracted by 5 percent. In the year 1965, it was allowed to grow at less than 1 percent while the government deficit was not controlled in the year 1979.

As far as the fiscal contraction in the medium term is concerned, it was most prevalent in the period following 1965.

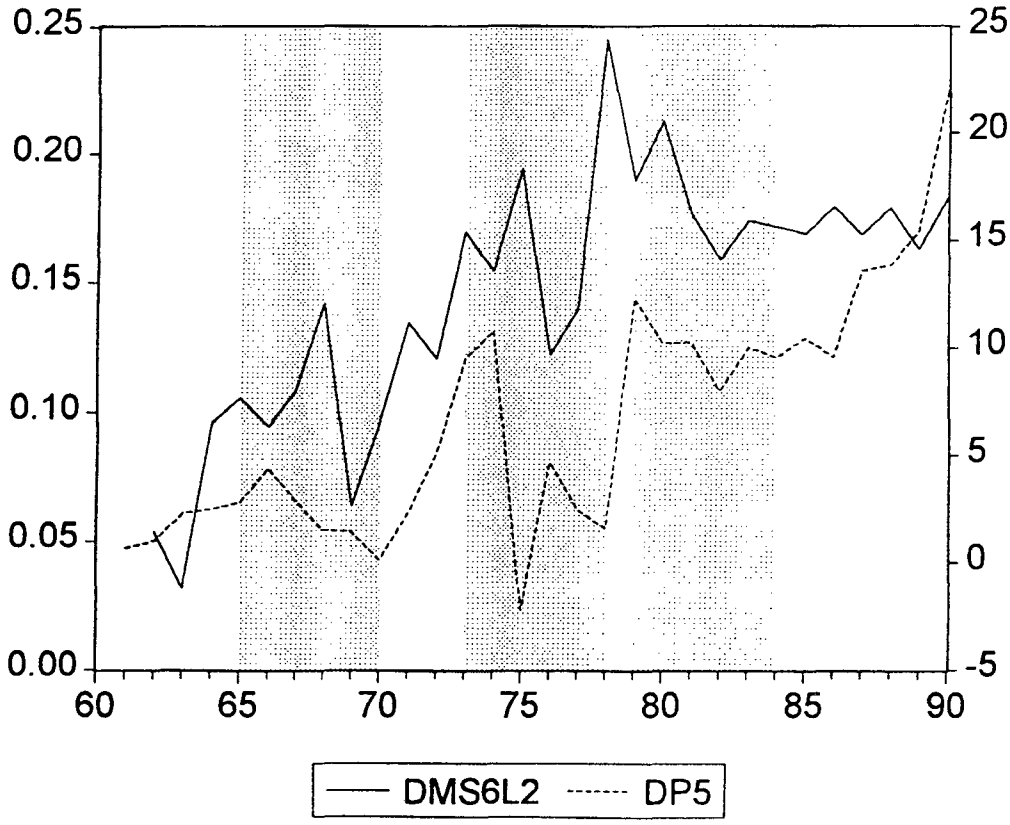
The suggestion that the output growth rate doesn't respond to fiscal stimulus/ contraction indicates towards the existence of a lag which can't be delineated very easily and a part of it operates indirectly through public investment. After a crisis, if the fiscal contraction continues in the medium run (as was the case after 1965 when

public investment was also low for too long), it tells on output growth even if symptoms of crisis are overcome completely. The stagnation in the early seventies can be attributed partly to the neglect of public investment during this period.



Monetary policy: Of the three exogenous shocks, the second oil crisis impinged on a very liquid economy, the first oil shock impinged on a moderately liquid economy while the 1965-67 shock impinged on an economy that was not very liquid. There has also been a tendency for excessive monetary growth following a good agriculture year. The lag with which monetary policy seeps in as inflationary pressures seems to be more than one year. In the AD equation, we find that the

effect of monetary policy operates with a two year lag. It seems that the monetary authorities have recognised this phenomenon. The inside lag of monetary policy seems to be quite large in reacting to inflationary pressures. Once the crises have become evident, monetary policy became either non-accommodating or excessively contractionary. Lack of information about the macroeconomic state has been a major reason behind these monetary policy anomalies. The graph (DMS6L2 DP5) represents the behaviour of



the two year lagged broad money supply in relation to price level during the 1960-90 period. In the years 1966 and 1974,money supply growth rate contracted very marginally while in 1980, it increased marginally. This shows that the immediate

response of money supply is not present. The medium run response of money supply is very fluctuating and these

fluctuations have been around a higher average value in each of the successive crises

The Indian monetary authorities have on the whole been guided by the idea that control of money matters and at the same time have also realised that expansionary monetary policy creates inflationary pressures with a lag of more than one year. But this knowledge has not consistently been translated into proper timing of the monetary policies. . Since it difficult to anticipate inflation so much in advance, the only safe monetary policy is to prevent excessively high growth rates and also avoid high fluctuations around the average value.

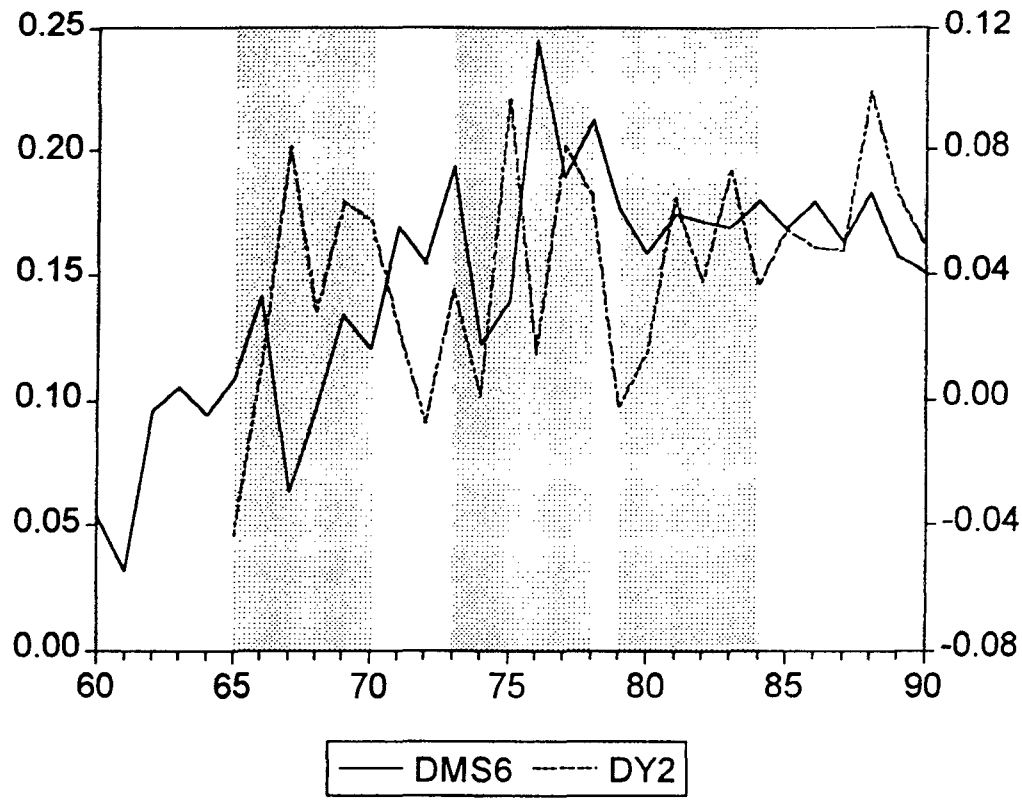
It can be argued that if food output falls, there is no need for special steps to be taken to contract domestic money supply. This is because maintaining consumption by running down food stocks or foreign exchange reserves would reduce undesired money balances and moderate the price increase. Some increase in prices and involuntary increase in velocity of money is unavoidable and would cease on the recovery of output. However, this argument requires the reserve position to be comfortable and that the previous monetary growth being moderate.

Monetary policy has operated mainly through quantitative credit control measures. Through these instruments the RBI has been able to control monetary growth through immobilising the reserves of the commercial banks. But the control of the exogenous elements of reserve money is beset with difficulties. Among the exogenous sources of reserve money growth, the most difficult to control has been

RBI lending to the government. RBI can affect it marginally through revising upwards the SLR requirement of the commercial banks. While SLR and CRR are powerful instruments, they have a potential of dislocating the credit market as in the case of the credit crunch of 1982. Such experiences have at times made the RBI unwilling to stick to rigid targets because of the fear of crowding out credit to the private sector and causing a recession.

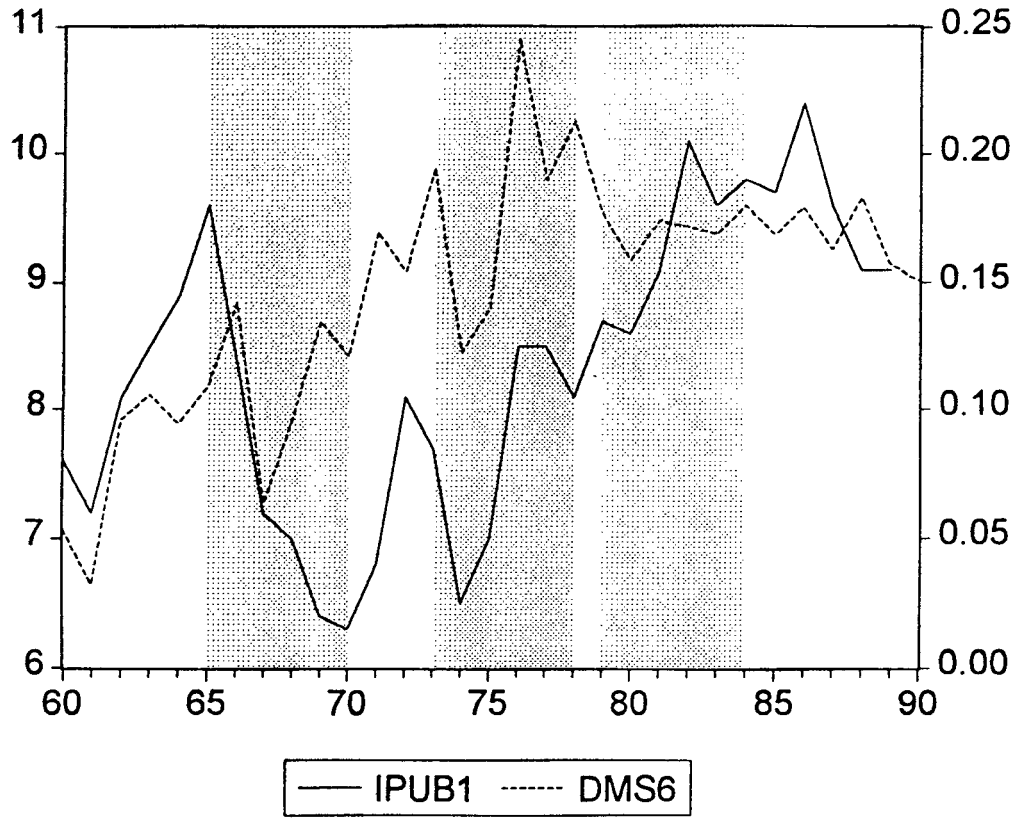
An important question that arises is whether monetary tightening during the crises has affected longrun growth adversely. A related observation is that public investment which is not sensitive to monetary policy is more unstable than private investment which is sensitive to monetary policy as pointed by Little and Joshi[3]. But there is a flaw in this sort of interpretation: public investment is insensitive to the interest rate , but, in a financially repressed economy where fiscal expansion spills over into monetary expansion, it is not proper to conclude that public investment is insensitive to monetary policy. On the contrary, a monetary contraction will most naturally axe public investment besides discouraging private investment(as domestic credit contracts). In the graph (DMS6 DY2), we notice that the years of very sharp contraction of money supply are associated with low output growth rates(except 1967) and the years of very sharp growth of money are also associated with low output

[3] Joshi, V. and Little, I.M.D., *India: Macroeconomics and Political Economy*. New Delhi: Oxford University Press, 1994



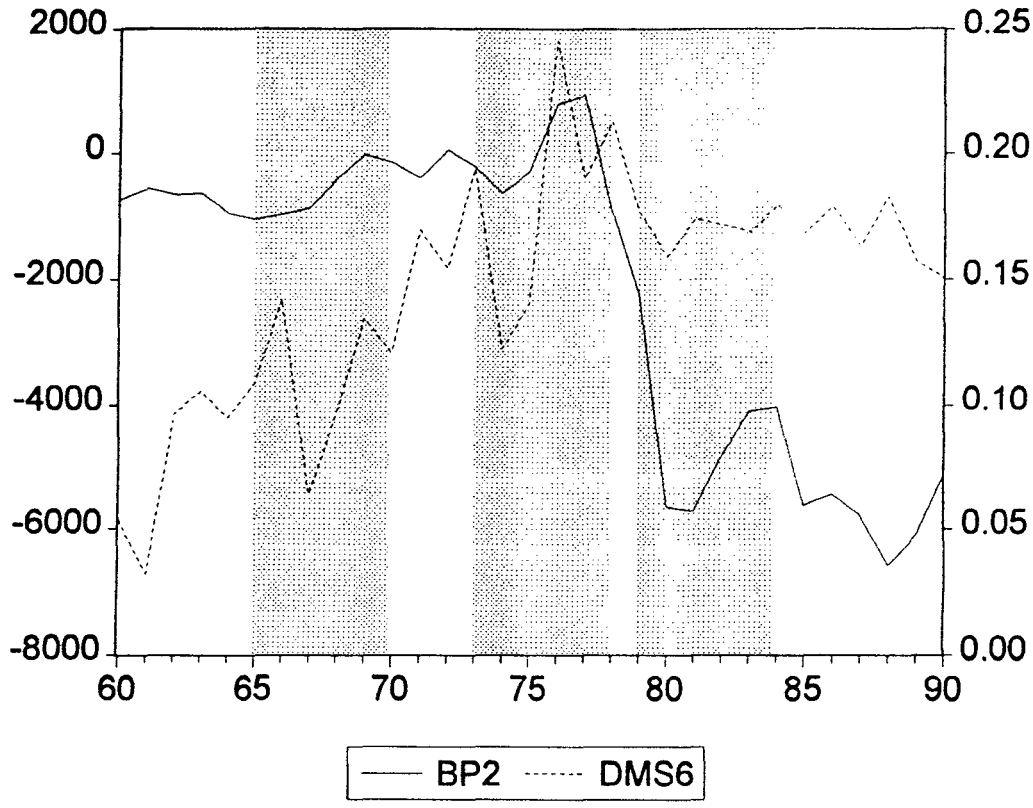
growth. So, high fluctuations in both directions seem to be not so conducive to output growth.

The graph (IPUB1 DMS6) that plots public investments as a percentage of GDP and the percentage change in money supply suggests clearly that public investment is quite sensitive to monetary policy in the Indian context. This correspondence between public investment and monetary expansion is evident during the period following all the three crises



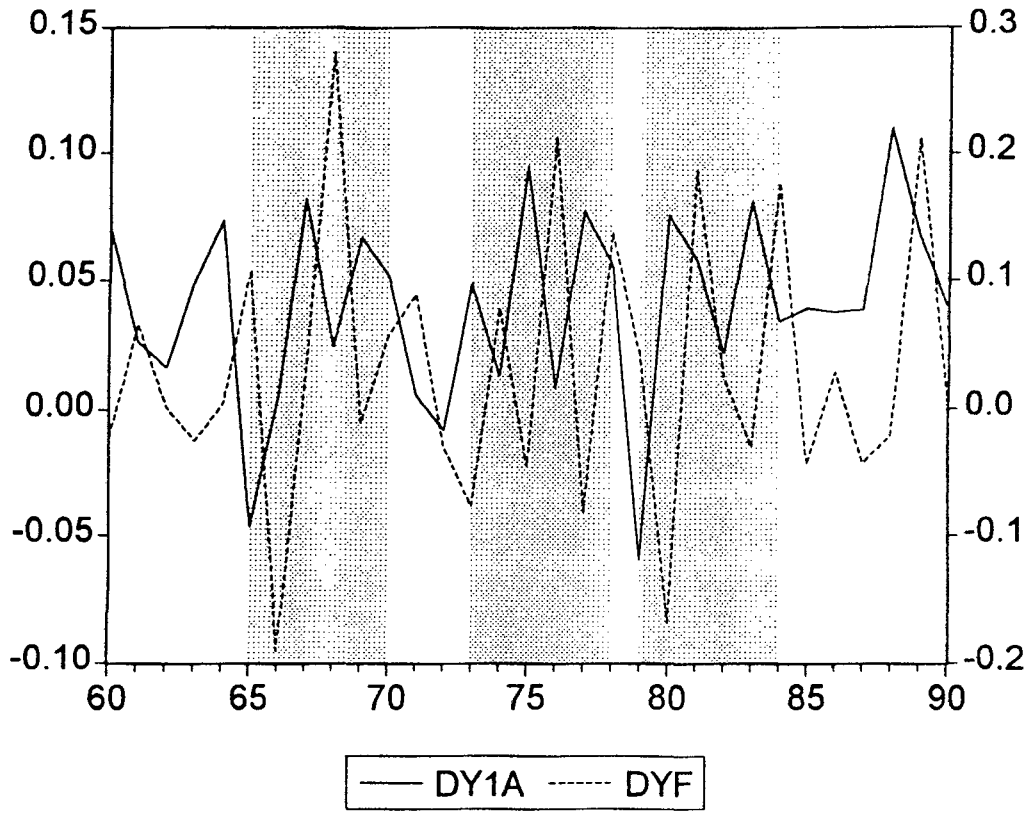
. The estimation of the BP2 equation shows that the balance of trade is significantly affected by the money supply variable. The graph BP2 DMS6 reveals that the period after 1979, which has a higher growth rate of money supply, has been characterised by very heavy deficits in the trade balance. This is due to the mixed effects of an appreciating real exchange rate and of high growth rates of money supply. In the years 1976 to 1979, the favourable exchange rate has more than compensated for the high growth rate of money supply. however, in the post 1979 period, when the REERSA appreciates and the high growth rate of money continues, the BOP plunges into heavy deficit.

so, on the balance of payments front, a high rate of monetary growth has to be countered through a depreciation of the REERSA or through imposing trade controls. In the first half of the 1980s neither of these measures were undertaken

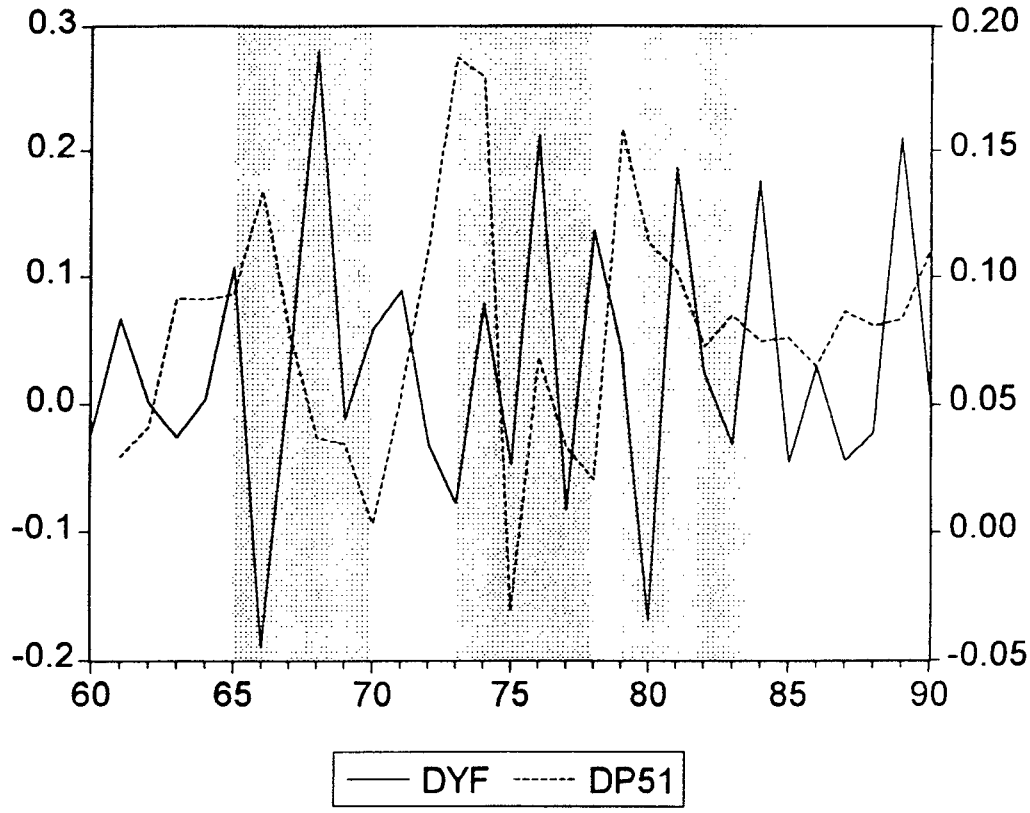


Foodgrains output: In the estimation of the AS function, the foodgrains output is not positively related to the output growth D(Y1A). This is also evident from the graph below which plots the proportional change in Y1A and the proportional change in foodgrains output. One observation in graph (DY1A DYF) is that the GDP

performance is neither very bad in all the years of bad harvests nor is it not very impressive in all the years of a good



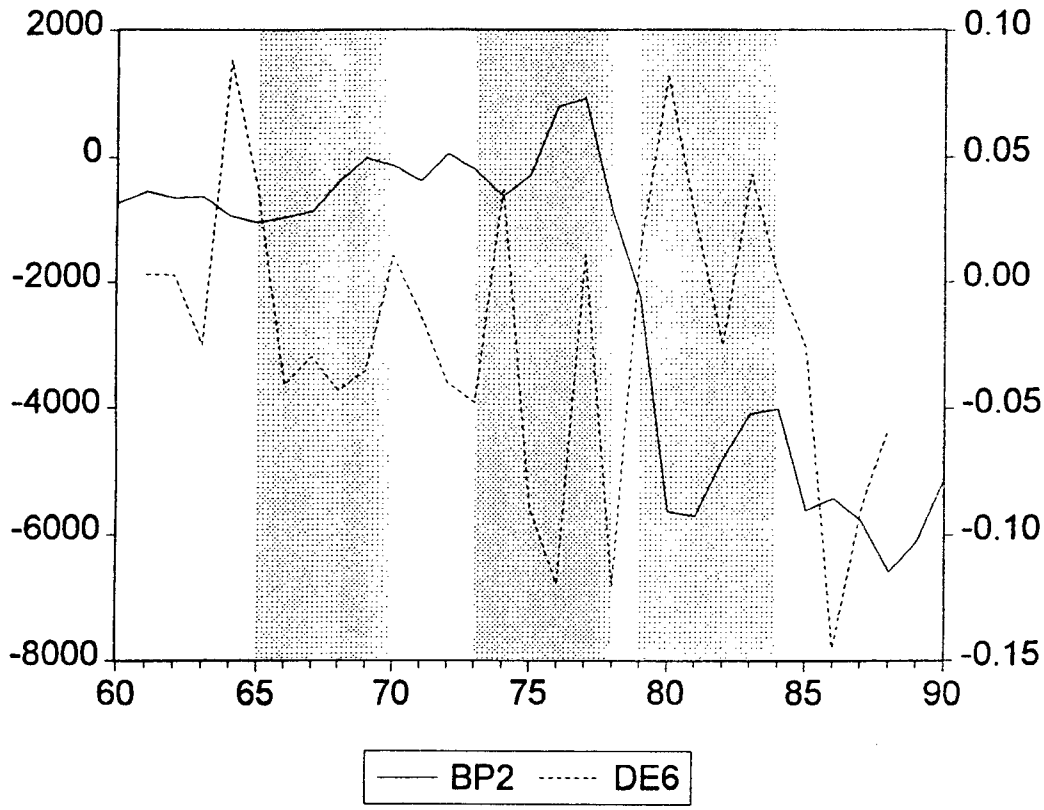
harvest. foodgrains output mainly affect the price variable rather than the output variables as shown in graph (DYF DP51). The AD equation that we have estimated severely understates this dependence of price on the foodgrains output.



A crisis normally reveals itself in the form of unsustainable BOP and government account deficits accompanied by a high inflation and perhaps a decelerating output growth rate. An interesting feature of the crises is that shortfall of foodgrains output do not affect the total output very adversely. The economy mainly adjusts mainly through price increases and the BOP deficit may become worse. Total output is affected only when the foodgrains output suffers setbacks for a few consecutive years in which case the balance of payments deficits and government deficits are kept within limits through cuts in public investments.

Exchange rate policy: the subsidy adjusted real exchange rate is a significant variable both for the trade balance and for real GDP growth. The graph(BP2 DE6)

plots the proportional depreciation (-)/ appreciation (+) of the rupee D(E6) and the balance of trade BP2. Throughout the period 1965 to 1979, the real exchange rate has depreciated in most years. This is also a period when the trade deficit was under



control (being positive for the years 1976 and 1977). After the second oil shock the real exchange rate(REERSA) appreciated except in 1982.

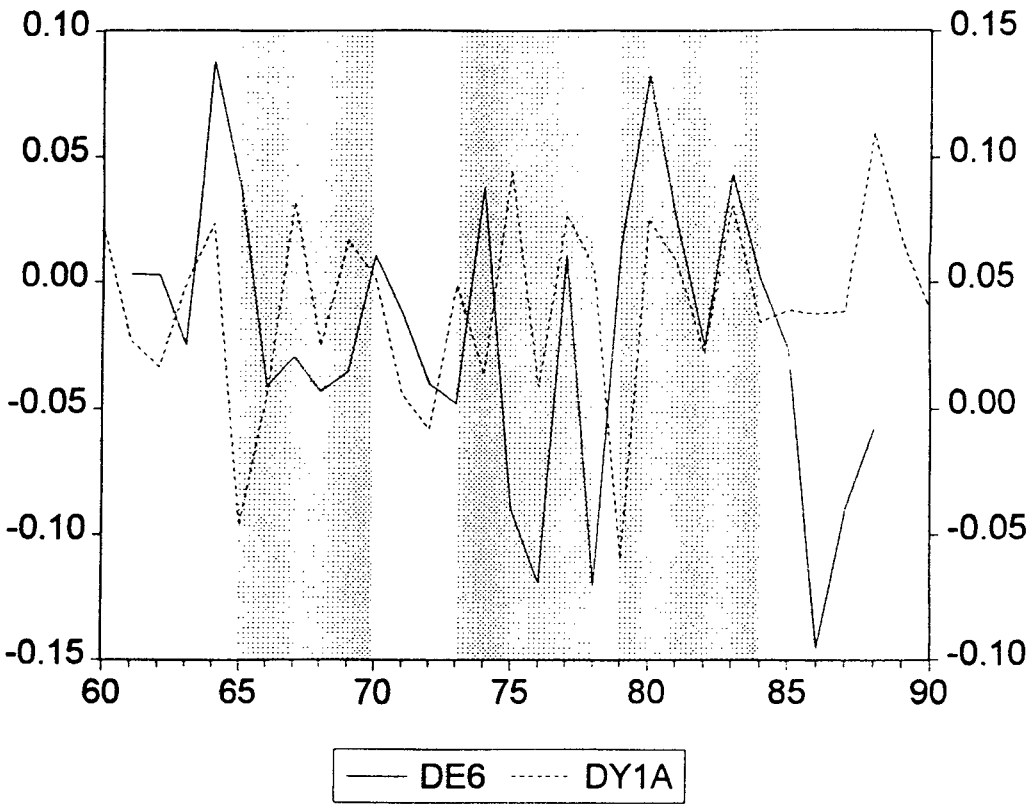
The estimation of the BP equation also shows that the real exchange rate is a significant factor explaining the trade balance. However, this variable might have absorbed the effects of the import liberalisation which had started in the late seventies. Nevertheless, this variable is very important in explaining the trade deficit. Another point should also be noted that while the REERSA depreciation during the

seventies is mainly due to a nominal depreciation of the rupee, during the eighties it was mainly due to high export subsidies which at it's peak in 1987 and 1988 touched 14 percent of the export volume.

The period 1966 to 1979, which is mostly characterised by a depreciating REERSA, the BOP deficits are under fair degree of control. However, import controls have also played an important role in this. In the period 1980 to 1985, when the REERSA appreciates, the trade deficit becomes very heavy. In the post 1985 period, the REERSA depreciates again which is mainly due to export subsidies rather than the depreciation of the nominal exchange rate. Part of the trade deficit is also explained by the gradual import liberalisation undertaken after 1980. A comparison between the 1973 to 1978 period and the post 1980 period reveals that the depreciation of the REERSA through nominal depreciation is more potent than that through export subsidies as far as controlling trade deficit is concerned. The theoretical reason for this is not difficult to understand. An export subsidy is undertaken when the cost structure of the economy is heavily distorted (heavily appreciated domestic currency is one of the chief reasons for this). Export subsidy is, therefore, only a second best instrument of providing incentive to exporters. Another reason is that nominal depreciation works on exports as well as imports i.e. boosts exports and restrains imports whereas the export subsidies while boosting exports encourages imports.

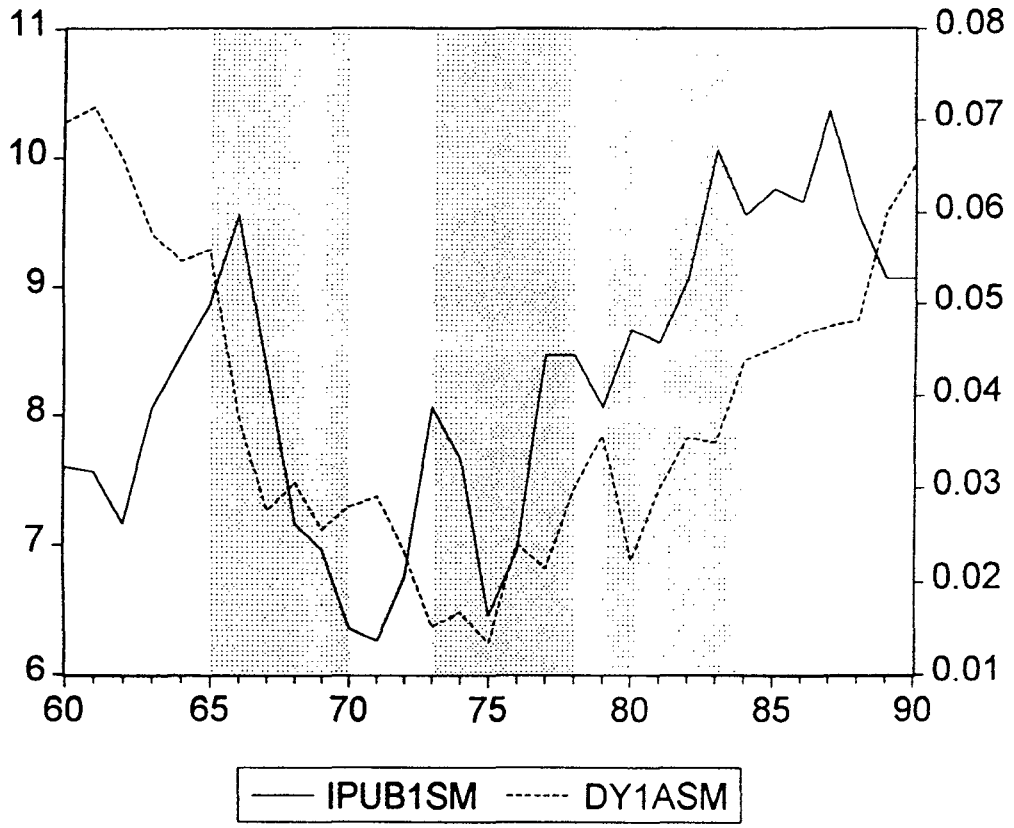
The graph(DE6 DY1A) which plots the percentage change in exchange rate D(E6) and rate of growth of real national income D(Y1A) also reveals a very strong relationship between these two variables. The period following 1965 shows a mild

depreciation of the REERSA, that following 1973 show a strong depreciation of the REERSA and the period following 1979 shows a fair degree of appreciation. A very important observation is that the downward fluctuation of the output growth is smallest in the year 1974-75 despite 1973-74 being a very bad year agriculturally. The exponentially smoothened real output growth rate reveals that the period following the



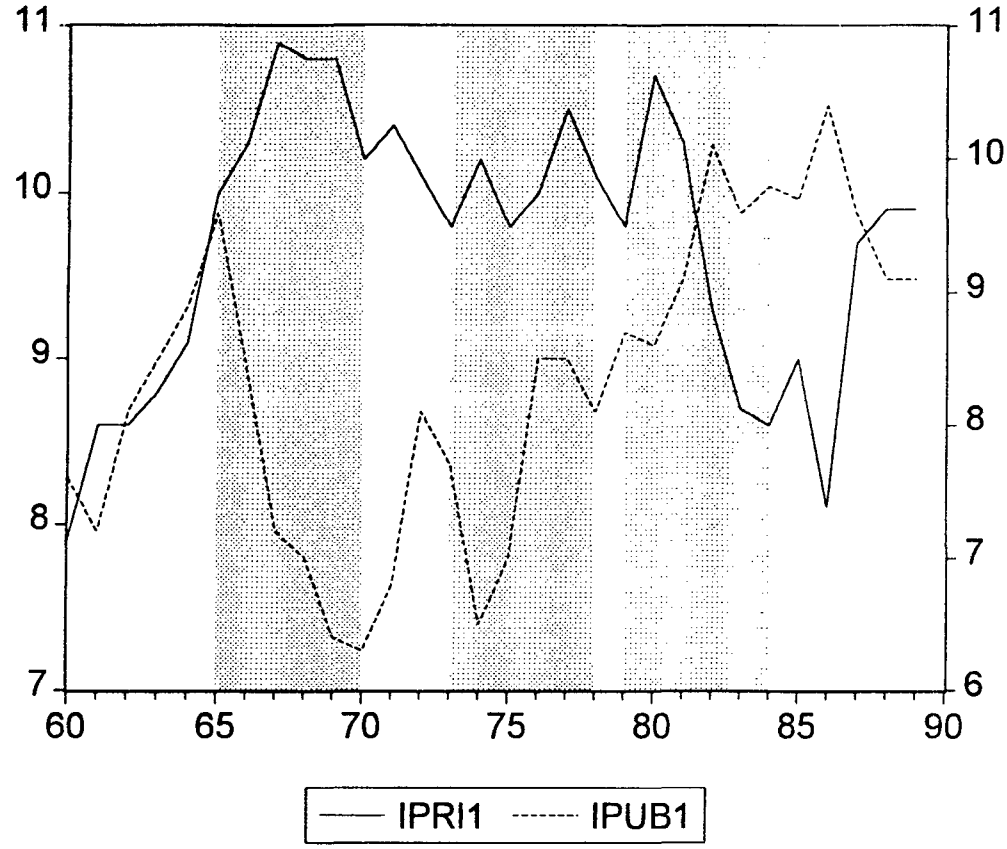
first oil shock doesn't perform too well in terms of output growth. The factor that possibly holds the explanation is the low public investment during the 1967 to 1976 period.

Investment and Growth: An important aspect of stabilisation is that it should be designed so as not to cut investment drastically. If there are sharp investment cuts, the growth of the economy in the medium run would be severely jeopardised.



The observation concerning the relationship between public investment as a percentage of GDP (exponentially smoothened) and the growth rate of GDP (exponentially smoothened) in the following graph is that in the period 1966-71, the former variable fell drastically from around 9.5 percent to around 6.5 percent and again fell in 1974 and 1975 after a brief recovery. During this entire period, the growth rate of GDP fell from over 5 percent to around 0.5 percent. In the post 1975

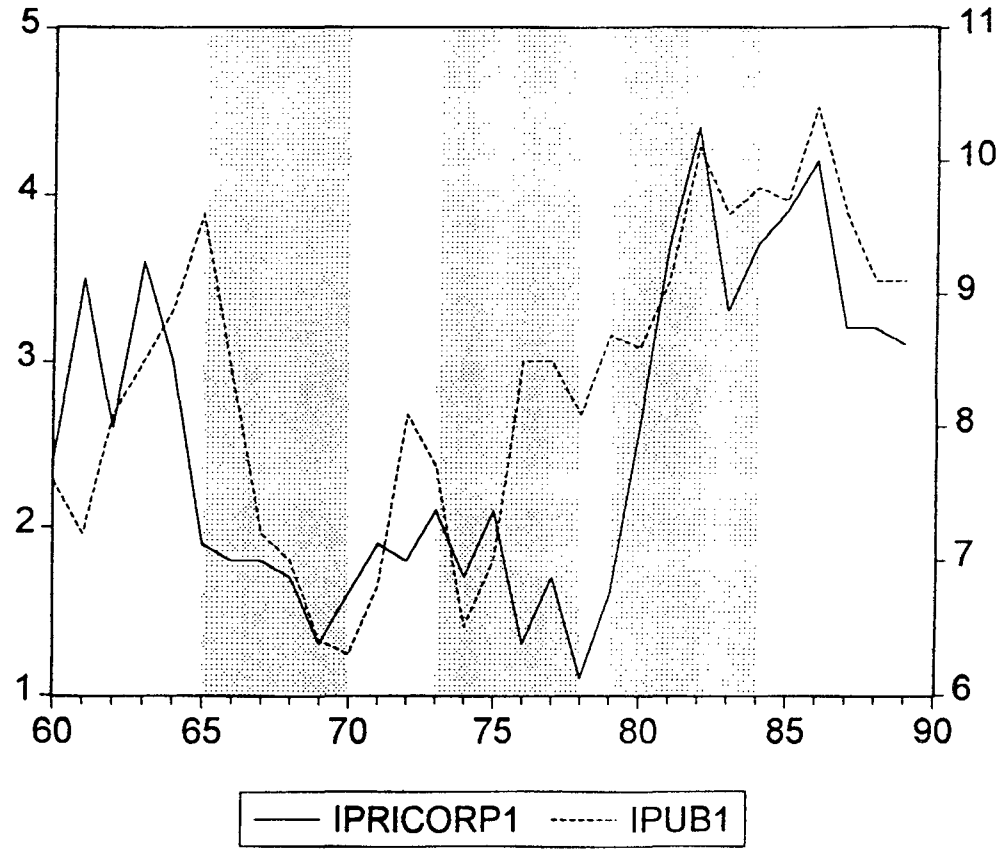
period, public investment picks up very sharply and the growth rate also responds accordingly. Hence, there is evidence of a strong correlation between these two variables.



Regarding the relative importance of public and private investment, we have the following observations:

- After the 1965-67 shock, private investment is more stable than public investment.
- After the 1973-74 shock, public investment picks up while private investment stagnates.
- After the 1979-80 shock, public investment becomes even higher while private investment falls as a percentage of GDP.

The graph (IPRI1 IPUB1)which plots private investment and public investment as a percentage of GDP reveals these facts. The graph depicts that in the period after 1965, total private sector investment and public sector investment are competitive in the sense that increase in one is at the cost of the other. However, private investment consists of



two very contrasting components : private household and private corporate investment. It is more meaningful to compare the relative movements of private corporate investment and public investment. The graph (IPRICORP1 IPUB1)reveals that private corporate investment broadly responds to the pattern of public

investment. But in the 1974-79 period, the private corporate investment did not respond to the increases in the public investment. This could be due to :

- the private investment may have been crowded out as public investment rose very sharply during this period from less than 6.5 percent of GDP to more than 8.5 percent of GDP. During this period, private corporate investment fell sharply.
- The private sector might be using it's existing capacity more efficiently.

In the period 1982-86, both private corporate investment and public investment were at very high levels but this discontinued after 1987 and appears to be unsustainable. The high private investment in this period is in part related to the gradual liberalisation of the economy that was initiated during this period.

It appears that investment performance during the period of stabilisation has depended on the ease with which funds were available to ride out the crisis period. In this respect, the 1979-80 crisis was most comfortably placed, followed by the 1973-4 crisis. The situation was very tight during the 1965-67 crisis and forced a sharp cut in investment especially public investment.

We have reason to believe that the synchronous movement of the private corporate sector investment and public sector investment is more because of the demand that the public sector investment creates for the private corporate sector. The stimulation of the private corporate sector investment is not so much due to the public sector infrastructure provision. The reason for this could be the lack of efficient management of the public sector infrastructure which has conditioned the private sector not to depend completely on the public infrastructure provision. The

insignificant coefficients of ii(-1) and Development D(YE) in the estimation of the AS equation hint towards this possibility.

The financial crowding out which we so often talk about is most striking in the case of public investment and private household investment. The evidence for such crowding out is not observed in the case of private corporate investment. In fact there is a suggestion of crowding in of private corporate investment as public investment picks up.

Conclusion

the theoretical model that we have considered in chapter one indicates policy implications under simplified implications. But the structure of the Indian economy is not as simple as assumed in these models. Therefore, the behaviour and structure of the actual economy is quite different from that in the theoretical model. The variables which are important in the theoretical model are not the most important variables in the actual economy. For example, the importance of interest rate in monetary policy is not so important in the actual economy and most variables some degree of quantitative control. The AD, AS and BP equations reflect the ways in which the structure of the economy is different from that in the theoretical model.

The empirical model starts with the structural equations which trap the different sectors of the economy. These structural equations serve as the basis for the reduced form equations AD, AS and BP. Many of the variables which appear in these structural equations do not appear in the final equation for one of the following reasons:

- they are insignificant in the final estimation and are likely to be less important in the context of the Indian economy
- for some variables reliable data does not exist and their proxies have been used

still, in the estimated equations we have retained some independent variables which seem to be insignificant but are otherwise considered to be very important in the Indian economy. The low t- values could be due to a flaw in the estimation

exercise or it may point towards a structural retrogression where gaps or distortions in the economy lead to a modified response of the economy towards these variables which would otherwise be expected to be very important.

The coefficients of the variables like government deficit, foodgrains production, infrastructure investment e.t.c. probably do not reveal fully the importance that these variables have in the determination of output and prices. In case of public sector investment in the public sector, there are a lot of fluctuations and the infrastructure investment has been especially low between 1967 and 1975. Even in years when the level of public sector investment was at high levels, certain key sectors have suffered bottlenecks. The public sector in India never emerged as a reliable and efficient supplier of infrastructure services. As a result, there has been a tendency on the part of the private corporate sector to depend on internal or alternative infrastructure facilities. As a result, the response of real output to the availability of public infrastructure is not very strong. The response of output has tended to depend on the synchronisation and efficiency with which the public sector supplies the infrastructure services. The years of high infrastructure investment are not exactly the ones in which the public infrastructure is supplied efficiently.

public sectors share in the Indian economy is very important. But this sector has been plagued by a lot of distortions. The behaviour of the public sector to some extent moulds the behaviour of the private sector in particular and the structure of the economy in general. The way the public sector investment and consumption is financed also has very important implications for the structure of the economy. The simulations that we run has, as it's basis, a structure of the economy which is

reflected by the AD, AS and BP equations that we estimate. The alternative policies that we assume in the simulations aims at an economy which is structurally somewhat different. There is no simple cause-effect relationship between the structure of the economy and the policies undertaken. The effect is two- way. These structural implications of alternative policies play up in the medium run. The shortcoming of the simulation exercise is that it treats the structure of the economy as parametric rather than acknowledging the impact of different policies on the structure of the economy. Therefore the simulation inadequate to capture these medium run effects of the alternative policies.

As far as the symptoms of crisis are concerned, the crises have been most plaguing on the BOP front. High inflation is the another important symptom of the crises. On the output front, the rate of growth of output has decelerated during all the three crisis periods. But the deceleration of output growth has not been so much of an alarm to the authorities who manage the economy. In their attempts at stabilisation, the authorities have faced the twin options of :

- adjusting the economy structurally so as to make the economy less vulnerable to exogenous shocks and also to accommodate the shocks if they are permanent in nature
- suppressing the symptoms of the crisis in the shortrun by bridging the financing gaps through foreign borrowing, tightening trade controls and orienting the monetary/ fiscal policies to the sole aim of controlling inflation.

The Indian authorities have tended to stress the later mode of adjustment even if it has involved the sacrifice of investment in the shortrun and output in the

shortrun as well as the medium-run. The former approach has largely been neglected until the most recent shock that coincided with the Gulf crisis. It is not that the case of structural adjustments presented itself only in the 1990s. The case for structural adjustments has always been present but only when economics is given priority over politics that the structural adjustments are actually undertaken. Structural adjustment is an indispensable component of crisis management because it reduces the future susceptibility of the economy to similar shocks besides making the policy framework more sustainable.

The approach of the authorities towards exchange rate policy has been is not consistent with their knowledge of the lag with which it operates. The evidence that monetary policy is reflected in price level with a lag of almost two years requires that monetary policy should not be used as an instrument of shortrun price control nor should it be allowed to get out of hand in years when the inflation and the balance of payments situation are easy. The behaviour of the money supply reflects that it was allowed to expand endogenously during the normal periods with crack down measures during the periods following the crises. This approach towards monetary policy is not very conducive to smooth growth rate of output.

The approach towards exchange rate policy has been veiled in nature. The reason for this was that the experience in the follow up of the 1966 devaluation had conditioned the Indian psyche to treat devaluation as something evil. The experience of the seventies has shown that a mild and continuous depreciation of the rupee is very healthy for the balance of payments. But this experience with the efficacy of the exchange rate policy did not translate into active exchange rate management in the

1980s. The approach in the 1980s had more than one drawback. The appreciation of the REERSA through increase in export subsidies is not as effective as a nominal depreciation of the rupee in easing the balance of payments situation. Export subsidies heavily burden the exchequer which is the source of another crisis. Export subsidies should complement rather than substitute nominal depreciation as incentives for exporters.

Control of inflation should attempted mainly through supply management and fiscal contraction should be adopted only when the existing fiscal deficit is very high. The adjustment on the fiscal side that is required should be qualitative rather than quantitative. The targeting and managerial efficiency of the fiscal expenditures are more potent in crisis management than the variation in it's magnitude.

BIBLIOGRAPHY

Adams, C.and Daniel, G., "the consequences of real exchange rates for inflation: some illustrative examples." IMF staff papers vol. 33 (september 1986)

Agarwala, R.A. *An Econometric Model of India.* London: Frank Cass, 1970.

Aghveli, B.B., "Inflationary Finance and Growth" Journal of Political Economy" vol. 85 (December 1977)

Aghveli, B.B. and Khan, M.S., "inflationary finance and dynamics of inflation: Indonesia 1951-72." American economic review vol. 67 (June 1977)

Barro, R.J., and Grossman H.I., "A General Equilibrium Model Of Income And Employment." *American Economic Review* 61 (1971)

Bergstorm, R. *The Construction And Use Of Econometric Models.* London: English Universities Press, 1967.

Bergstorm, R. and Wymer, D. "A Model of Disequilibrium Neo-classical Growth and it's Application to the United Kingdom." *In Statistical Inference in Continuos Time Economic Models*, edited by R. Bergstorm. Amsterdam: North Holland, 1976

Blejer, M.I., "The Short Run Dynamics of Prices and Balance of Payments." American Economic Review (Nashville, Tennessee) vol. 67 (June 1977)

Buiter, W.H., *international macroeconomics.* Oxford clarenden. 1990.

Dickey, d.a., and fuller, w.a., "likelihood ratio tests for autoregressive time series with unit tests." econometrica vol. 49 (July 1981)

Dornbusch, R., *Open Economy Macroeconomics.* New York: basic books, 1980.

Ebril, L.P. and Fries, S.M., "Broad Money Growth and Inflation in The United States." IMF Staff Papers Vol. 38 (December 1991)

Engle, R.F. and Byuing, S.Y., "Forecasting and Testing in Cointegrated Systems." Journal of Econometrics Vol. 35 (May 1987)
Engle, R.F. and Granger, C.W.J., "Cointegration and Error Correction: Representation, Estimation and Testing." Econometrica Vol. 55 (march 1987)

Haque, N.U. and Montiel, P.J., "Fiscal Adjustments in Pakistan: Some Simulation Results." *IMF Staff Papers* vol. 40, no. 2 (June 1993)

Harberger, A.C., "Currency Depreciation, Income and Balance of Trade." *Journal of Political Economy* (Chicago) , vol. 58 (February 1950)

Joshi, V. and Little, I.M.D., *India: Macroeconomics and Political Economy*. New Delhi: Oxford University Press, 1994

Johnston, J., *Econometric Methods*, Third Edition. New York: McGraw Hill,1991.

Khan, Mohsin, "Monetary Shocks and Dynamics of Inflation." *IMF Staff Papers* Vol. 27 (June 1980)

Khan, M.S. and Montiel, P.J., "Real Exchange Rate Dynamics in a Small Primary Exporting Country." *Imf Staff Papers* vol. 34 (December 1987)

Khan, M.S. and Roberto, Z., "Trade and Financial Liberalisation Given External Shocks and Inconsistent Domestic Policies." *IMF Staff Papers* Vol. 32 (1985)

Lahiri, A.K., "Money and Inflation in Yugoslavia." *IMF Staff Papers* Vol. 38 (December 1991)

Laursen, S. and Metzler, L.A., "Flexible Exchange Rates and Theory of Employment." *Journal of International Economics*, Amsterdam vol. 16 (1984)

Little, I.M.D., *Economic Development: Theory, Policy and International Relations*. New York: Basic Books, 1982.

Madalla, G.S., *introduction to Econometrics*. New York: Macmillan 1992.

Marston, R. "Stabilization Policies in Open Economies." *In Handbook of International Economics*, edited by Jones, R.W. and Kenen, P.B. Amsterdam: North Holland, 1985

Maria, E.G., "Output Fluctuations and Monetary Shocks in Columbia: Comment on Rienhart and Rienhart ." *Imf Staff Papers* Vol. 40 (1993)

Montiel, P.J. and Ostry, J.D., "Macroeconomic Implications of Real Exchange Rate Targeting in Developing Countries." *IMF Staff Papers* Vol. 38 (1991)

Montiel, P.J. and Ostry, J.D., "Real Exchange Rate Targeting Under Capital Controls: Can Money Provide a Nominal Anchor." *IMF Staff Papers* Vol. 39 (1992)

Obsfeld, M., "Aggregate Spending and The Terms Of Trade: Is There a Lauren-metzler Effect." *Quarterly Journal Of Economics* (Cambridge, Massachusetts) vol. 97 (may 1992)

Ostry, J.D., "The Balance of Trade, Terms of Trade and Real Exchange Rate: An Intertemporal Optimising Framework" *IMF Staff Papers* Vol. 35 (December 1988)

Phillips, P.C.B., "Time Series Regression with a Unit Root." *Economatrica* Vol. 55 (march 1987)

Polak, J.J., "Monetary Analysis of Income Formation and Payments Problems." *International Monetary Fund Staff Papers* VI (1957-58).

Reinhart, C.M. and Reinhart V.R. "Output Fluctuations and Monetary Shocks: Evidence from Columbia" *IMF Staff Papers* Vol. 31 (1991)

Sargent, T.J., " The Ends of Four Big Inflations." In *Inflation* edited by Robert E. Hall. Chicago: Chicago Univ. press, 1982.

Tanzi, v., Mario, b. and Mario, o.t., "inflation and the measure of fiscal deficit." imf staff papers vol. 38 (1991)

Tobin, J., "The Interest Elasticity of The Transaction Demand for Cash." *Review of Economics and Statistics* 38 (1956)

Vegh, C.H., "The Effects of Currency Substitution on The Response of The Current Account Supply Shocks." *IMF Staff Papers* Vol. 35 (December 1988)

Data source

IMF international financial statistics for the series P5(GDP deflator); IL4 (foreign exchange reserves); MS2 (domestic credit); Y2 (National Income at constant prices); Y1 (national income at current prices); MS6 (broad money i.e. money plus quasi money); P4 (import price index); P3 (export price index); FL (foreign loans and grants); MS7(MS6+MS1= financial wealth held by the public);MS1 (foreign assets).

CMIE data for YE (total energy production); YF (total foodgrains production); IT3 (import of capital and intermediate goods); II (= IPUBINF infrastructure investment in the public sector); IPUBINF (total public sector investment); IPRI (total private investment); GFFOR (foreign financing of government deficit); GFDOM (domestic financing sources of the government deficit).

Joshi, V. and Little, I.M.D., *India: Macroeconomics and Political Economy*. New Delhi: Oxford University Press for data on E6 (subsidy adjusted real effective exchange rate); SUB (export subsidies).