DEVELOPMENT AND CHANGE

Essays in Honour of K.N.Raj

DEVELOPMENT and CHANGE

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15 Stabilization and the Control of Government Expenditure in India*

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We have had some exceptional economists in India who have combined brilliant academic careers with active engagement in policy making. In the process they have provided a remarkable articulation of ideas between the staid world of scholarship and the down-to-earth realities of everyday economic management. As a consequence, the teaching of economics and the making of economic policy have both been considerably enriched. Professor K. N. Raj is a leading exponent of this *gharana*. Over a period of more than forty years, he has published a large number of seminal papers which have shaped the way in which many generations of students have come to see and interpret the working of the Indian economy. At the same time, from a stint in the Planning Commission in the early fifties to his recent role as a member of the Prime Minister's Economic Advisory Council, he has remained a major influence on the analytical discourse underlying the choice of economic policies. This paper is a small tribute to K. N. Raj and his tradition.

Economic policies are invariably based on certain assumptions about the working of the economies in which the policies are introduced. If there are features of the actual working of an economy which invalidate some of the critical assumptions underlying a policy, then the policy is apt to lead to consequences which are quite different from those which were intended. It is argued here that the effectiveness of macroeconomic policies in India is impaired by precisely such a mismatch between assumption and reality. In the presence of certain peculiar features of the Indian economy, which derive from its highly regulated character, conventional policies can lead to quite unconventional results. Macroeconomic policies, particularly fiscal policies, must be designed taking into account these specificities if the policies are to be made more effective.

The argument is presented here with the help of some simulation experiments relating to India's current stabilization programme.[1] However, the

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[1] On the goals and targets of the programme see budget documents for 1992–93 and the

programme itself is really incidental to the main thrust of the paper, which seeks to inform the choice of basic fiscal strategies. The implications of such choices for stable growth extend well beyond the current stabilization effort. A simple macroeconomic model, which incorporates some of the 'specificities' of the Indian case, is first developed in part 2. The model is then used to simulate the impact of different fiscal policy instruments and some exogenous parameters during 1992–93 and 1993–94 in part 3. It must be emphasized that these empirical experiments are *not* forecasts. Their only purpose is to compare the outcomes of alternative policies in a stylized framework. Government expenditure compression is a major component of the Indian programme as in most other stabilization programmes. However, the same order of expenditure compression can lead to very different consequences, depending on its composition. Hence the equity and growth implications of the chosen composition of expenditure compression is examined in part 4 of the paper. Finally the major implications of the analysis for the choice of a fiscal strategy aimed at high growth with stability are pulled together in some concluding remarks in part 5.

1. THE BACKGROUND

The emphasis laid on public expenditure compression in the present stabilization programme stems from a widely held perception that, apart from systemic considerations, the current problems of internal and external imbalance are largely attributable to excessive public expenditure growth. During the eighties the Indian economy grew at a higher rate than in any past decade, led by a sharp acceleration in public expenditure (table 1). However, this was also a decade which saw an acceleration in the trend inflation rate, a sharp increase in public debt and the re-emergence of a balance of payment problem after a period of relative stability in the seventies. According to one view, the high growth of public expenditure was pump priming aggregate demand beyond the rate of growth of productive capacity; with excess demand partly fuelling inflation at home and partly spilling over into a growing external current account deficit. This deficit moreover had to be increasingly financed through commercial borrowings with a gradual decline in concessional assistance. As a consequence, the external debt servicing burden rose from less than 10 per cent of exports in 1980 to around 27 per cent by 1990 (Jalan 1992).

Despite many early warnings from economists, both inside and outside the government, little was done by way of corrective action because of various political preoccupations. Hence, when a third oil shock hit the world in 1990 following the invasion of Kuwait, the Indian economy was plunged into a deep balance of payments crisis. Foreign exchange reserves

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Memorandum of Economic Policies for 1992–93 in the Finance Minister's letter to the Managing Director of the International Monetary Fund, dated 2 June 1992.

Table 1. Growth Rates of Government Expenditure

	All Governments		Central Government	
	Nominal	Real	Nominal	Real
1971–74	7.6	–6.9	4.1	–10.1
1974–79	13.3	6.9	9.1	2.6
1979–83	18.6	6.9	20.1	8.1
1983–87	17.2	9.5	18.5	11.5

Note:

Real expenditure is measured at 1970–71 prices. Growth rates have been estimated by fitting a kinked exponential growth curve.

Source: Mundle and Rao (1992).

were rapidly run down, India's credit rating was down-graded, external lines of credit were turned off and the country was close to defaulting on its external obligations in early 1991. The new government which took charge in June 1991 introduced a series of quick measures to overcome the immediate payments crisis. By the end of March 1992 foreign exchange reserves had risen to over 5½ billion dollars as compared to only about a billion dollars a year earlier, most of it coming from the IMF, the World Bank and the members of the Aid India Consortium. However, this substantial concessional assistance has been extended on the understanding that India will undertake a range of policy measures to restore fundamental internal and external balance.

India is now an IMF programme country and the policy measures under implementation are similar to the adjustment packages introduced in most programme countries, based on the IMF Financial Programming model (IMF 1987). A single instrument is unlikely to simultaneously correct both the internal and the external imbalance. Hence expenditure switching policies such as exchange rate depreciation and import compression were introduced in order to switch domestic and world demand from importable goods and services to domestic output, prior to a phased reduction of quantitative restrictions and tariffs, while expenditure reduction policies were assigned to compress the growth of domestic demand and restore internal balance. An additional set of structural adjustment policies is being phased in to ensure improvements on the supply side: greater overall efficiency, international competitiveness and a higher long-term growth potential.

Whether or not the supply-side structural adjustment policies will eventually transform India into a dynamic export-led economy like many of its Asian neighbours outside South Asia is still an open question which is left aside here. Instead the paper focuses attention on the short-term demand management measures and their potential macroeconomic impact in the

presence of certain peculiar features of what is still a highly controlled economic regime. What are these peculiar features which could potentially distort the impact of stabilization policies? Among others, three in particular should be noted.

The first and most important of these relates to the process of price formation. It is now generally recognized that manufactured goods are largely characterized by *fixed price* markets in India. Also, for many of these commodities the prices are either directly or indirectly administered by the government itself. These include all publicly provided goods and services such as coal, diesel, petrol, gas, electricity; road, rail and air transport; irrigation and water supply; post and telecommunication services; heavy engineering goods from boilers to locomotives; fertilizers and heavy chemicals, metals other than steel which has now been decontrolled, etc. Recent structuralist models in India have taken account of such *fixed price* behaviour by separately demarcating a *fixed price* industrial sector and *flex price* agricultural sector.[2] However, in addition to industrial prices, the prices of major agricultural products and some related consumer goods are also administered, with variations in supply or demand being accommodated through adjustment of stocks. These commodities include foodgrains, edible oils, sugarcane, cotton, jute, etc. Thus the *fixed price* segment of the economy stretches well beyond industry.

Administered prices do not prevent open market or black market clearing prices from settling above the administered price. However, they effectively set a price floor which could shift up or down independent of the state of demand. This fundamentally alters the process of inflation as compared to a flexible price regime. It also implies that in a demand constrained economy aggregate expenditure reducing measures aimed at containing inflation would simply contain output while inflation could continue unabated.[3]

The second special feature relates to the determination of investment. Conventional theories of investment treat it as a function of either some measure of the level of economic activity, the acceleration principle, or the cost of capital. In the Indian context neither of these two types of determinants is appropriate because of the high level of government intervention in investment. A large part of investment is undertaken by the government itself, either through its different departments or through the various public enterprises, in accordance with a predetermined plan.

[2] For recent empirical work on industrial prices in India see Chatterjee (1989), Rakshit (1982) and several of the papers in Rakshit (ed.)(1989) which present analytical models where, typically, the agricultural sector is *flex price* while industry is a *fixed price* sector.

[3] The relationship between administered prices and inflation has been explained specifically in the context of procurement prices by Patnaik (1975), Patnaik, Rao and Sanyal (1976), Bose (1985) and Dasgupta (1989). On the inflationary implications of administered industrial prices see Jha and Mundle (1987) and Sikdar (1989). For a recent analysis of the implications of a large *fix price* segment for the inflation process in India see Balakrishanan (1991).

Apart from this direct control of public sector investment, the goverment also controls a substantial proportion of private investment through public sector financial institutions like the IDBI, ICICI, LIC, etc. As a matter of deliberate policy, interest rates have been administered and held below their market clearing level in the past, thus creating a persistent excess demand for funds. Investment decisions on large private sector projects have, therefore, been driven not so much by the level of economic activity or the cost of funds but the availability of own funds and the loan rationing decisions of public sector financial institutions.

A third special feature of the economy, which derives from the first two, has to do with the role of money supply in the system. If prices and interest rates are administered, the effects of a variation in money supply do not get smoothly transmitted to the rest of the system either through price level and real balance adjustments or through the route of interest rate adjustments and the corresponding response of investment and other activities to a change in the cost of money. However, the effect of variations in money supply still gets transmitted to the rest of the system through several alternative routes.

Thus the level of inventory investment, which generally accounts for 10 to 15 per cent of total investment, is influenced among other things by the quantity of bank credit to the commercial sector. Second, loans from commercial banks are an important source of funds for the financial institutions, which ration long-term investment loans to most large investment projects. Such portfolio investment by the banks is in turn related to the growth of their own deposits. Third, given a funds-constrained financial market with differentiated interest rates and possibilities of arbitrage, changes in the flow of bank credit will affect the availability of non-institutional funds for investment, including the firms' own funds. This would happen through a reallocation of resources between working capital and investment, either directly within firms or through arbitrage between firms in the informal credit market. Finally, a change in the flow of bank credit could change the overall level of transactions even without a change in interest rates in a funds-constrained economy. This could in turn influence the level of investment as envisaged in the accelerator relationship. For these and other reasons it may be assumed that changes in money supply will change the level of investment and aggregate demand. Whether this would in turn primarily lead to a change in the level of output or a change in the level of prices will depend on whether the economy is initially in a Keynesian demand-constrained condition or a supply-constrained world of quantity theory.

2. The Model

In this part of the paper a macroeconomic model is developed incorporating the three special features of the Indian economy described above, i.e.,

(1) the existence of administered prices covering a very large segment of the economy, (2) government control of the level of investment, and (3) the altered mechanism through which the effect of money supply variations is transmitted in the presence of (1) and (2).

Price and Output Determination

First generation macroeconometric models in India assumed either explicitly or implicity that aggregate supply was infinitely elastic and that the level of output was determined by aggregate demand (Bodkin *et al.*, 1991). This was also a dominant point of view in the so-called 'stagnation debate' initiated by a seminal paper from Raj (1976).[4] However, it is desirable that, al least at the level of its theoretical structure, an empirical macro model should allow for the economy to be either demand- constrained or supply-constrained, leaving the matter of which constraint is binding to be resolved empirically. Accordingly, in this model output and price level are simultaneously determined by the intersection of a downward sloping aggregate demand curve with a supply curve which is horizontal up to some normal level of capacity output Q_n and sloping upwards thereafter. The system is either demand-constrained or supply-constrained depending on whether the demand and supply curves intersect at a level of output less than or greater than Q_n.[5]

Aggregate real demand Q_d is a function of price P (in a one-commodity model P is the aggregate price level) and nominal income Y, given by

$$Y = C + I + G_1 - D \qquad (1)$$

where C is consumption expenditure, I is gross capital formation, G_1 is government consumption expenditure and D is the trade deficit, all measured in rupees at current prices. Assuming $C = C(Y)$ we have

$$Q_d = Q_d(P,A) \; ; \; Q_{d1} < 0, Q_{d2} > 0 \qquad (2)$$

where $A = I + G_1 - D$.

Alternatively we can write the aggregate inverse demand function

$$P = P(Q_d, A) \; ; P_1, P_2 > 0 \qquad (3)$$

If P_f is a floor price level, Q_n is the normal capacity (real) output and Q the level of real output at a given point of time, then the aggregate supply function described above can be written as

[4] Among other contributions to the debate see Chakravarty (1974), Nayyar (1978), Patnaik (1981), Mundle (1981,1981a), Bagchi (1970), Desai (1981), Rangarajan (1982), Srinivasan (1977), etc. For a supply side view along with a survey of the debate see Ahluwalia (1985).

[5] For an attempt to identify whether the demand or the supply constraint is binding in the case of industrial goods see Lahiri and Roy (1986). In this paper the terms are used to imply equilibrium points lying on the horizontal *(fix price)* segment of the aggregate supply curve, where markets are cleared only through quantity adjustments, and equilibrium points lying on the upward sloping (*flex price*) segment of the supply curve, where markets clear through the adjustment of both prices and quantities.

$$P = P_f \text{ for } Q \leq Q_n$$
$$\text{and } P = P_f + F(Q - Q_n) \text{ for } Q > Q_n ; F_1 > 0 \qquad (4)$$

In other words for output greater than Q_n, the supply price is a function of the excess of output over normal capacity output.[6]

Where the market clearing output $\hat{Q}$ is greater than Q_n, from (3) and (4) we have

$$\hat{Q} = Q(P_f, Q_n, A) \qquad (5)$$

and by logarithmic differentiation

$$\dot{\hat{Q}} = \alpha_1 \dot{P}_f + \alpha_2 \dot{Q}_n + \alpha_3 \dot{A} \qquad (6)$$

where a dot over the variable denotes the rate of growth of the variable and α_i $(i = 1, 2, 3)$ denotes the elasticities of equilibrium output with respect to the relevant variable. It can be easily verified that when $Q \leq Q_n$

$$\dot{\hat{Q}} = \alpha_1 \dot{P}_f + \alpha_3 \dot{A} \qquad (7)$$

Similarly the aggregate demand function (3) and the aggregate supply function (4) yield the equilibrium price equation

$$\hat{P} = P(P_f, Q_n, A) \qquad (8)$$

It follows that

$$\dot{\hat{P}} = \beta_1 \dot{P}_f + \beta_2 \dot{Q}_n + \beta_3 \dot{A} \qquad (9)$$

where β_1, β_2, β_3 are the elasticities of equilibrium price level $\hat{P}$ with respect to P_f, Q_n and A respectively.

It can be verified that for $Q \leq Q_n$

$$\dot{\hat{P}} = \dot{P}_f \qquad (10)$$

Equations (6) and (9) (or 7 and 10) give us the computable equations for output growth and inflation. The empirical counterpart of $\dot{P}_f$ should be interpreted as the minimum percentage change of the general price level (WPI) which would occur, *ceteris paribus*, as a consequence of the direct and indirect effects of $\dot{P}_a^*$, the average of given percentage changes in administered prices of foodgrains (procurement prices) or other agricultural commodities and industrial commodities (including fuel, power and lubricants).

The relationship between administered price changes, demand management and inflation have been discussed at some length above. While some empirical researchers like Brahmananda (1977) and Krishnamurthy (1984)

[6] The empirical counterpart of P_f may be interpreted as the minimum general level of prices which would prevail for a given vector of administered prices P_a^*.

maintain that the expansion of money supply can trigger demand-pull inflation, others like Bhattacharya (1987) and Balakrishnan (1991) reject the view that inflation in India is attributable to excessive money supply growth. The present model allows for both cost-push inflation as well as demand-pull inflation, leaving the relative importance of their effects to be determined empirically. This will be evident from equations (9) and (10). The empirical exercise of determining the actual shape of the aggregate supply curve and the corresponding choice of the appropriate reduced form equation for determining the rates of change of equilibrium output and prices is discussed in the Appendix.

Finally, normal capacity output in period t, $Q_n(t)$ is proportional to fixed capital stock at the end of the previous period.

$$Q_n(t) = \theta K(t-1) \tag{11}$$

where θ is the output–capital ratio and K is the stock of real fixed capital. It follows from (11) that

$$\dot{Q}_n(t) = I_F(t-1) / K(t-2) \tag{12}$$

where $I_F(t-1)$ is real net fixed capital formation in the previous period. The determination of investment and fixed capital formation are discussed further below.

The Government Budget Constraint

Total government expenditure at current prices, E, is subject to the government budget constraint[7]

$$E = T + F \tag{13}$$

where T denotes total tax plus non-tax revenue and F is the fiscal deficit. Given revenue buoyancy t^*, total revenue in the current period is given by

$$T = \{1 + t^* (\dot{P} + \dot{Q})\} T(t-1) \tag{14}$$

where $\dot{P}$ and $\dot{Q}$ are endogenously determined, and t^* is a policy parameter which could change in response to institutional changes like tax reform. The fiscal deficit F is derived from PQ the endogenously determined nominal GDP, and f^*, the ratio of fiscal deficit to GDP, which is assumed to be a key policy parameter in the model:[8]

$$F = f^* PQ \tag{15}$$

On the expenditure side, government consumption expenditure G_1 is treated as a function of total government expenditure E and $G_1(t-1)$. The

[7] In the simulation exercises the Centre's expenditure E_1 has been derived from E assuming $E_1 = 0.6462\ E$.

[8] In the empirical exercise f^* is manipulated through adjustments of the central government fiscal deficit to GDP ratio f_1^*, assuming $f^* = 1.27\ f_1^*$.

lagged dependent variable $G_1(t-1)$ is included to capture a certain degree of irreversibility which is built into government consumption expenditure (Pandit, 1985):

$$\dot{G}_1 = G_1 [\dot{E}, \dot{G}_1(t-1)] ; G_{11} > 0, G_{12} > 0 \qquad (16)$$

Regarding capital expenditure, it has been observed that in India departmental capital expenditure by the government or its budgetary support to non-departmental enterprises is a residual after deducting total revenue expenditure G, which includes government consumption expenditure G_1 as well as current transfers such as interest payments, subsidies, etc. (Toye 1981, Mundle and Rao 1992). $G = g^* PQ$ where the revenue expenditure to GDP ratio g^* is a policy parameter. It can be manipulated by varying the level of subsidies, reducing or increasing public debt, modifying other transfers, etc., thereby altering the flow of government capital expenditure S_1:

$$S_1 = E - G \qquad (17)$$

S_1 is one source of financing public sector capital formation. A second source is the gross capital formation of public enterprises, S_2. However, total public sector investment is not equal to the sum of S_1 and S_2 because a part of S_1 is actually deployed to finance a part of S_2 by way of budget support to public enterprises. Also, a portion of S_1 may be set aside for portfolio investment, defence capital expenditure and other items which do not constitute capital formation. Public sector capital formation I_g^* is therefore only a fraction k of $S_1 + S_2$

$$I_g = k(S_1 + S_2) \qquad (18)$$

where k is an empirically determined exogenous parameter.

Investment Expenditure

Reference has been made earlier to the highly interventionist role of government in determining, among other things, the level of investment (capital formation) in the economy. This should be captured in a model of investment behaviour in India. Such intervention has two distinct components. One is the direct public sector investment, I_g, determined endogenously through equation (18) above. This, together with private investment, I_p, gives total investment

$$I = I_g + I_p \qquad (19)$$

Hence

$$\dot{I} = b\dot{I}_g + (1-b)\dot{I}_p ; 0 < b < 1 \qquad (20)$$

where b and $(1-b)$ are respectively the weights of public and private investment.

The second component of intervention is the control of private investment through the financial institutions and banks, which are largely owned and controlled by the government. Empirical researchers in India have usually tried to interpret the behaviour of private investment in terms of specifications which incorporate elements of both the accelerator theory as well as the neo-classical theory of investment.[9] However, while both these theories assume that the supply of funds is elastic, it is now recognized that in India investment funds have been rationed at below market clearing rates of interest (Krishnamurthy and Sastry 1976, Lahiri *et al.* 1984). Conventional variables such as the level of output, capacity utilization, interest rates, etc. should not therefore be expected to perform very well as compared to the availability of internal and external funds (Rangarajan 1972, Lahiri *et al.* 1984). It was also explained at some length above that in a regime of 'financial repression' changes in money supply would affect the level of investment and economic activity. Hence the private investment function may be written as

$$I_p = I_p (S_3, Z^*, M_3) ; I_1, I_2, I_3 > 0 \qquad (21)$$

where S_3, the gross savings of the private corporate sector, is a measure of the availability of internal funds, Z^* is a policy variable measuring the disbursement of long-term loans by the financial institutions and M_3 broad money supply.

Empirical estimation of the investment function is discussed in the appendix.

Real investment growth $\dot{I}_r$ is given by the difference between growth of nominal investment and the inflation rate

$$\dot{I}_r = \dot{I} - \dot{P} \qquad (22)$$

The bulk of real investment consists of fixed capital formation in India. Inventory investment accounted for only about a tenth of total investment prior to the mid-sixties. During the subsequent decade of slow growth the share of this component doubled. However, in the period of recovery from about the mid-seventies, fixed capital formation recovered and it now accounts for over 85 per cent of total investment (Mundle and Mukhopadhyay 1991). Assuming, therefore, that fixed capital formation is a stable function of total investment, we have

$$\dot{I}_p = \tau \dot{I}_r \qquad (23)$$

where τ is the elasticity of real fixed capital formation with respect to total real investment.

[9] For recent surveys of alternative theories of investment see Precious (1987), Artus and Muet (1990). Bhattacharya (1975) and Krishnamurthy and Sastry (1976) have surveyed the empirical literature on investment behaviour in India.

Money Supply

Given a money multiplier v, the supply of money M_3 depends on the stock of high-powered money H:

$$M_3 = vH \tag{24}$$

Since the money multiplier has been empirically observed to have been stable throughout the eighties,[10] we have

$$\dot{M}_3 = \dot{H} \tag{25}$$

The rate of growth of high-powered money $\dot{H}$ is in turn given by

$$\dot{H} = \frac{F_m + R}{H(t-1)} \tag{26}$$

where R is the exogenously determined change in foreign currency assets of the Reserve Bank of India and F_m is the change in stock of monetized debt. This is assumed to be a proportion h^* of GDP, the proportion itself being an exogenously determined policy parameter.

$$F_m = h^* PQ \tag{27}$$

External Sector

The demand for real imports M_r is assumed to depend on real GDP Q:

$$M_r = M(Q)\,;\, M_1 > 0 \tag{28}$$

Denoting the elasticity of real import demand with respect to GDP as m^* we have

$$\dot{M}_r = m^* \dot{Q} \tag{29}$$

Though m^* is a behavioural parameter it is useful to think of it as a policy parameter since it can be manipulated through changes in trade policy. Thus, expenditure switching policies such as imposition of quota restriction, raising tariffs or a devaluation of the exchange rate would all lead to a downward shift in this parameter.

The growth in nominal (rupee) imports can now be written as

$$\dot{M} = \dot{P}_m + \dot{e} + m^* \dot{Q} \tag{30}$$

where $\dot{P}_m$ is the rate of change in dollar prices of imports and $\dot{e}$ is the rate of change of the exchange rate. Recall that the trade deficit in rupees has been denoted as D (equation 1). Now, using equation (30) and writing the dollar value of exports as X, the change in trade deficit $\dot{D}$ may be written as

[10] See Report on Currency and Finance, 1987–88, Vol. 1, Reserve Bank of India, 1988.

$$\dot{D} = \delta(\dot{P}^*_m + \dot{e} + m^*\dot{Q}) - (\delta - 1)(\dot{X} + \dot{e}) \qquad (31)$$

where δ is the ratio of imports to trade deficit.

3. Stabilization Experiments with Alternative Fiscal Policies

The model developed above is used in this part of the paper to simulate the impact of alternative fiscal policies for aggregate demand management. The fiscal policies analysed include tax policy (t^*), administered price policy (P^*_a), fiscal deficit policy (f^*_1), and revenue expenditure control policy (g^*). The outcomes are monitored in terms of a vector of six target variables, i.e., inflation ($\dot{P}$), and the rates of growth of output ($\dot{Q}$), investment ($\dot{I}$), money supply (M_3), trade deficit (D) and the level of central government expenditure (E_1). In each experiment the model is run for alternative values of one policy instrument, keeping the other policy instruments fixed at their base values. These are either values observed in the recent past or envisaged in the stabilization programme. The impact of each policy instrument can be assessed by comparing alternative solutions for the target vector with the solution in the base run, which is also reported in each case. The simulations are essentially comparative static exercises. However, a dynamic element is introduced in the sense that the solutions for 1992–93 serve as the exogenously predetermined values for simulating 1993–94.

The base run shows that with all other policy instruments set at their recently observed levels and the fiscal deficit of the central government reduced to 5 per cent of GDP, growth remains under 3 per cent in the current year but rises to over 5 per cent in 1993–94. Money supply growth declines to around 11 to 12 per cent in both years but inflation also stays at around 11 to 12 per cent, implying a rise in the velocity of circulation. Central government expenditure rises from around Rs 116,000 crores in 1992–93 to about Rs 137,000 crores in 1993–94. The rupee trade deficit grows at about 14 to 15 cent in the current year and by as much as 25 per cent in 1993–94. In other words reduction of the fiscal deficit and a corresponding compression of central government expenditure, without any further policy changes, would only temporarily reduce growth. However, prices would continue to rise at over 11 per cent per annum and the rupee trade deficit would continue to grow very rapidly.

a. Expenditure Switching and the Trade Deficit

In the first experiment an attempt is made to assess the possible macro-economic impact of aggregate expenditure-switching policies. There is considerable uncertainty here regarding the time required for the effect of a change in the relative price of exports and imports to work itself out and also regarding external non-price factors affecting world demand for Indian goods. The model is therefore run with varying rates of export growth (in US $) and under alternative assumptions regarding the adjustment of

Table 2. Macro Effect of Alternative Rates of Growth of Exports

Panel A: Income elasticity of demand for imports 0.9

	1992–93						1993–94					
$\dot{X}$	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)
5%	**2.6**	**11.7**	**17.1**	**10.7**	**14.4**	**115.8**	**5.5**	**11.3**	**23.6**	**11.1**	**24.9**	**136.7**
7%	2.7	11.7	17.1	11.1	8.7	115.9	5.6	11.3	23.7	11.8	13.6	137.3
9%	2.8	11.7	17.2	11.5	3.0	116.1	5.7	11.3	23.7	11.8	13.6	137.3
11%	2.9	11.7	17.2	11.9	–2.7	116.2	5.8	11.3	23.7	12.1	7.9	137.6

Panel B: Income elasticity of demand for imports 0.6

	1992–93						1993–94					
$\dot{X}$	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)
5%	**2.6**	**11.7**	**17.1**	**10.7**	**11.4**	**115.9**	**5.6**	**11.3**	**23.7**	**11.11**	**8.6**	**137.0**
7%	2.8	11.7	17.1	11.1	5.6	116.0	5.7	11.3	23.7	11.4	12.8	137.3
9%	2.9	11.7	17.2	11.5	–0.2	116.1	5.8	11.3	23.7	11.8	7.0	137.6
11%	3.0	11.7	17.2	11.9	–6.1	116.3	6.0	11.3	23.7	12.1	1.2	137.9

Note: Assumptions $f_1^* = 5\%$, $\dot{P}_a^* = 9\%$, $t^* = 1.00$, $g^* = 23\%$, $m^* = 0.9$ or 0.6, $Z^* = 18936$ crores (1992–93) and 23635 crores (1993–94). For identification of symbols see list of variables and parameters in the Appendix. Base run is in bold type.

import elasticities (m^*) in response to the expenditure-switching policies, in order to check the sensitivity of overall economic performance to variations in trade performance. The income elasticity of imports m^* for the period 1979–80 to 1988–89 is estimated at 1.21. The simulation exercises have been run assuming that expenditure-switching policies have reduced the elasticity to either 0.9 or 0.6. The exchange rate is assumed to remain stable at the adjusted rate.

The quantitative results are reported in table 2. The inflationary effect of initial exchange rate adjustment has been suppressed here since the rate of administered price increases remains fixed at the base rate (9 per cent). However, output growth turns out to be relatively insensitive to trade performance. Varying the rate of growth of exports (in US $) from only 5 per cent to as much as 11 per cent yields extra growth of less than half a percentage point in either 1992–93 (2.6 per cent to 3 per cent) or 1993–94 (5.6 per cent to 6 per cent) even when the income elasticity of imports is reduced to as little as 0.6.

Other endogenously determined variables such as the rate of growth of investment or money supply and central government expenditure are also relatively insensitive to trade performance. The impact of the latter is seen primarily in the trade deficit. During the current year, a variation in export growth from 5 per cent to 11 per cent reduces growth of the rupee trade deficit from 14.4 per cent to (–) 2.7 per cent when import elasticity is assumed to be 0.9. When the import elasticity is reduced to 0.6, the impact is even stronger. The growth of trade deficit is now seen to decline from 11.4 per cent to (–) 6.1 per cent.

However, in all the simulations, growth of the rupee trade deficit accelerates in the second year. It would be quite unrealistic to assume that the income elasticity of imports can be reduced below the values of 0.9 or 0.6 assumed here. Expenditure switching policies also cannot be repeated again and again. It follows that growth of the trade deficit can be contained only through a very sharp and sustained acceleration of export growth (in US $), which will have to largely depend on non-price factors at home and abroad.

b. The Macroeconomic Effects of Tax Reform

Turning now to aggregate demand management, the macroeconomic effect of each fiscal policy instrument is explored in turn, starting with tax policy. The effects of tax policy can be captured in the model by perturbing revenue buoyancy t^* which is a policy parameter. Though revenue also includes non-tax revenue, such as dividend from public enterprises, interest receipts, etc., 85 per cent of all revenue consists of tax revenue. Hence changes in revenue buoyancy would largely reflect changes in tax policy and vice versa. The changes in rates, reduction of exemptions, a small beginning in presumptive taxation and other initiatives introduced in the last budget, following the recommendation of the Tax Reforms Committee

Table 3. Macro Effects of Changes in Revenue Buoyancy

t^*	1992–93 $\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)	1993–94 $\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)
1.00	**2.6**	**11.7**	**17.1**	**10.7**	**14.4**	**115.8**	**5.5**	**11.3**	**23.6**	**11.1**	**24.9**	**136.7**
1.25	3.2	11.7	18.1	10.7	16.6	118.2	6.3	11.3	25.4	11.2	27.9	143.0
1.5	4.4	11.7	21.5	10.8	20.9	122.6	8.0	11.3	29.0	11.3	33.9	155.3
1.75	5.8	11.7	24.9	10.9	26.0	127.8	10.0	11.3	33.7	11.6	41.6	171.0

Note: Assumption $f_1^* = 5\%$, $\dot{P}_a^* = 9\%$, $g^* = 23\%$, $m^* = 0.9$, $Z^* = 18936$ crores (1992–93) and 23635 crores (1993–94), $\dot{X} = 5\%$. For identification of symbols see list of variables and parameters in the appendix. Base run is in bold type.

(Chelliah Committee) have already led to a sharp increase in the flow of central government revenues during the current year and a corresponding rise in revenue buoyancy.

The macroeconomic effects of changes in revenue buoyancy are summarized in table 3. Though increases in revenue buoyancy up to 1.75 have been simulated, in actual fact even an increase up to 1.25 would be quite remarkable. This would yield *extra* growth of about 0.5 per cent to 1.0 per cent during 1992–93 and in 1993–94 without any *extra* inflation compared to the base run. This *extra* growth would come mainly through somewhat higher public expenditure and higher growth of (public) investment as a consequence of larger government revenues. However this would also result in an even higher growth of rupee trade deficit compared to the base run, taking it to around 17 per cent in 1992–93 and around 34 per cent in 1993–94.

c. The Inflationary Impact of Administered Price Increases

Though administered prices are not conventional fiscal policy instruments, in the Indian context they have important fiscal implications. Thus an increase in food procurement prices, without a commensurate increase in issue prices in the public distribution system, would increase revenue expenditure on food subsidy. On the other hand an increase in prices of goods or services provided by departmental or non-departmental undertakings could lead to an increase in non-tax revenue. However the main impact would take the form of increased tax revenue flows as a consequence of higher inflation and the higher growth of nominal GDP. While developing the model in the preceding section, it was explained why administered price increases should be expected to have a very strong inflationary impact in the Indian context. The results summarized in table 4 quantify this strong impact. As the average annual rate of administered price increase is varied from 5 per cent to 20 per cent, the inflation rate rises from about 11 to 14 per cent in 1992–93 and 10 to 15 per cent in 1993–94.

Growth, on the other hand, declines from 2.7 to 2.1 per cent in 1992–93 and 5.7 to 4.9 per cent 1993–94. The higher inflation rate lowers the net growth of real demand and hence real GDP. This helps to moderate the growth of the rupee trade deficit, but the effect is too weak to make much of a difference. Thus, as the annual rate of administered price increases is raised from 5 to 20 per cent, the growth of rupee trade deficit falls from 15 to 12.7 per cent in 1992–93, but it still increases by almost 23 per cent in 1993–94.

d. Fiscal Deficit and Capital Expenditure Compression

Compression of the fiscal deficit is a key element of the fiscal policy stance adopted by the government. In this experiment the fiscal deficit to GDP ratio is varied from 5 per cent to 6.5 per cent while keeping revenue expenditure fixed at 23 per cent of GDP. In other words variations in the

Table 4. Macro Effects of Changes in Administered Prices

	1992–93						1993–94					
$\dot{P}_a^*$	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)
5%	2.7	10.8	17.0	10.6	15.0	115.0	5.7	9.9	23.4	10.9	25.7	134.2
9%	**2.6**	**11.7**	**17.1**	**10.7**	**14.4**	**115.8**	**5.5**	**11.3**	**23.6**	**11.1**	**24.9**	**136.7**
15%	2.3	13.1	17.3	10.8	13.4	117.0	5.1	13.5	23.9	11.3	23.7	140.5
20%	2.1	14.3	17.4	10.8	12.7	118.1	4.9	15.3	24.2	11.4	22.8	143.8

Note: Assumptions $f_1^* = 5\%, t^* = 1.0, g^* = 23\%, m^* = 0.9, Z^* = 18936$ crores (1992–93) and 23635 crores (1993–94), $\dot{X} = 5\%$.
For identification of symbols see list of variables and parameters in the appendix. Base run is bold type.

Table 5. Macro Effects of Changes in Fiscal Deficit Ratio

	1992–93						1993–94					
f_1	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)
5.0%	**2.6**	**11.7**	**17.1**	**10.7**	**14.4**	**115.8**	**5.5**	**11.3**	**23.6**	**11.0**	**24.9**	**136.7**
5.5%	3.6	11.7	19.7	10.7	18.2	119.8	5.6	11.3	23.5	11.1	25.2	141.5
6.0%	4.7	11.7	22.4	10.8	22.2	124.0	5.6	11.3	23.4	11.2	25.6	146.5
6.5%	5.8	11.7	25.1	10.9	26.2	128.1	5.7	11.3	23.3	11.3	25.9	151.5

Note: Assumption $P_a^* = 9\%$, $t^* = 1.00$, $g^* = 23\%$, $m^* = 0.9$. $Z^* = 19836$ crores (1992–93) and 23635 crores (1993–94), $\dot{X} = 5\%$. For identification of symbols see list of variables and parameters in the appendix. Base run is in bold type.

fiscal deficit are entirely absorbed through variations in capital expenditure. The results are summarized in table 5. Compressing the fiscal deficit from 6.5 per cent to 5.0 per cent substantially reduces (public) investment. The rate of growth of output consequently falls from 5.8 per cent to only 2.6 per cent in 1992–93, recovering to about 5.5 per cent in 1993–94. The corresponding rate of growth of rupee trade deficit is also almost halved by the deficit reduction, but it is still over 14 per cent in 1992–93 and surges to about 25 per cent in 1993–94. Inflation is not responsive to variations in aggregate demand or fiscal deficit reduction because of structural factors and the demand constrained condition embodied in the exercise.

Note that the effect of a one-shot reduction in the fiscal deficit is quite shortlived. In the second year the growth of investment, real output and trade deficit along the $f_1^* = 6.5$ per cent path is similar to that along the $f_1^* = 5$ per cent path. Repepated reduction of f_1^* would keep down the growth of (public) investment and real output but it would neither curb inflation nor eliminate the trade deficit.

e. Revenue Expenditure Compression

Deficit reduction in the previous experiment was achieved through compression of capital expenditure. However, for reasons which are discussed in the next section, it is desirable that public expenditure compression be aimed at items of revenue expenditure rather than capital expenditure. Accordingly, in this final experiment simulations are run with variations in the revenue expenditure to GDP ratio g^*, keeping other policy instruments fixed at the base rates. Revenue expenditure here refers to current expenditure of the central and state governments taken together. At present this amounts to approximately 23 per cent of GDP.

The results summarized in table 6 show that even a small variation in this ratio can lead to a significant variation in the growth of investment and hence output. Thus a 1 percentage point reduction in the revenue expenditure ratio would raise the rate of growth of investment from about 17 per cent in the base run to over 21 per cent, mainly because of larger availability of funds for public investment. This in turn would lead to an increase of the rate of growth of output from 2.6 per cent to almost 4 per cent. Note that central government expenditure, which is endogenously derived in the model, is actually larger in absolute terms when revenue expenditure is compressed. Given a fiscal deficit ratio and tax buoyancy, higher output obviously allows for a higher level of government spending. However higher growth means greater absorption and this translates to a higher growth of the rupee trade deficit. This rises from 14 per cent in the base run to 19 per cent in 1992–93 when the revenue expenditure ratio is reduced by 1 percentage point. However, in both cases the growth of the rupee trade deficit again approaches 25 per cent by 1993–94.

Table 6. Macro Effects of Changes in Revenue Expenditure Ratio

	1992–93						1993–94					
$\dot{g}$	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)	$\dot{Q}$	$\dot{P}$	$\dot{I}$	$\dot{M}$	$\dot{D}$	E_1 (000 crores)
22.0%	3.9	11.7	21.2	10.8	19.0	117.2	5.4	11.3	23.4	11.1	24.8	138.3
22.5%	3.2	11.7	19.1	10.7	16.7	116.5	5.5	11.3	23.5	11.1	24.9	137.5
23.0%	**2.6**	**11.7**	**17.1**	**10.7**	**14.4**	**115.8**	**5.5**	**11.3**	**23.6**	**11.1**	**24.9**	**136.7**
24.0%	1.3	11.7	13.1	10.6	9.8	114.5	5.5	11.3	23.9	11.0	25.0	135.2

Note: Assumptions $\dot{f}_1^* = 5\%$, $\dot{P}_a^* = 9\%$, $t^* = 1.00$, $m^* = 0.9$, $Z^* = 18936$ crores (1992–93) and 23635 crores (1993–94), $\dot{X} = 5\%$. For identification of symbols see list of variables and parameters in the appendix. Base run is in bold type.

4. The Pattern of Expenditure Compression

The simulation experiments reported above show that an increase in tax buoyancy, combined with restraint in administered price increases, could put the economy on a path of high growth with price stability. However, it would be imprudent to assume that the current high buoyancy of taxes will be retained or that the tax–GDP ratio can be raised indefinitely. It had already risen from about 6 per cent in 1950–51 to 11 per cent by 1970–71 and further to about 17 per cent in the eighties, overshooting the tax revenue targets set for the Seventh Plan period in the Long Term Fiscal Policy (Mundle and Rao 1992). As such tax reforms are now aimed at raising the share of direct taxes instead of a further increase in the tax–GDP ratio. At least a part of the fiscal adjustment has to come, therefore, from expenditure compression.

This leads immediately to the question of resource allocation in government and the pattern of expenditure compression. The compression of different components of public expenditure can lead to very different effects. The simulation exercises showed that even in the short run compression of capital expenditure can adversely affect growth while compression of revenue expenditure promotes growth. This is all the more true in a medium- to long-term context where changes in capacity matter. Unfortunately there has been a fairly sharp decline in the share of capital expenditure in total government expenditure over the past two decades (table 7).

Thus capital formation in the public sector has tended to get crowded out by items of revenue expenditure in government, particularly interest payments, subsidies and government consumption. At the same time the very manner of financing public expenditure, i.e., the large-scale resort to borrowing, has tended to restrict the availability and raise the cost of funds for private investment, thereby crowding out private investment. Taken together these two effects have constrained the renewal and expansion of productive capacity in the system (Mundle and Rao 1992). Since this constrains the future growth potential of the economy, it is essential that expenditure compression measures now reverse this tendency, protecting capital expenditure as far as possible and raising its share in total government expenditure.

Closely related to government spending on physical capital formation is the allocation of public funds for development of human resources. Modern theories of growth recognize that investments in education and health play a vital role in growth, perhaps strategically even more important than physical capital formation. Furthermore, public expenditure on primary education, basic health care, delivery of potable water, etc. have a strong redistributive effect, usually far more effective than progressive taxation (Gillis 1989). The same applies to expenditure on the so-called anti-poverty programmes. Despite the leakages and inefficiencies in such programmes,

Table 7. Economic Classification of All Government Expenditure

(per cent)

		1971–72	1975–76	1980–81	1985–86	1986–87	1987–88
1.	REVENUE EXPENDITURE	53.0	61.9	63.4	66.0	67.0	70.5
1.1	Consumption expenditure	29.8	36.8	35.0	34.0	32.8	34.0
1.11	Compensation to government employees	19.2	24.4	23.9	22.3	21.8	22.8
1.12	Goods and services	10.6	12.4	11.1	11.6	11.0	11.2
1.2	Interest payment	6.9	6.7	7.2	9.0	10.8	11.8
1.3	Subsidies	4.4	5.6	8.7	11.3	10.8	11.4
1.4	Transfers	11.9	12.7	12.5	11.7	12.5	13.3
2.	CAPITAL EXPENDITURE	47.0	38.1	36.6	34.0	33.0	29.5
3.	TOTAL EXPENDITURE	100.0	100.0	100.0	100.0	100.0	100.0

Source: Mundle and Rao (1992).

which are routine in most government programmes, independent reviews suggest that they have been quite effective in alleviating distress (Minhas *et al.*1991).

All these taken together constitute what might be called the redistributive package of government spending. The expenditure on such programmes in real per capita terms is still very small. As recently as 1987–88 the direct spending on anti-poverty programmes and food subsidy, described in table 8 as 'transfers under agriculture and allied activities', amounted to only Rs 3 per head at 1970–71 prices. Adding to this about 40 per cent of the spending on education which goes to primary education and the total spending on health (though only a part subsidizes the poor), total redistributive expenditure per capita works out to only Rs 29 as against a per capita expenditure of Rs 35 on general administration, Rs 39 on interest payments and Rs 43 on defence!

Clearly it is necessary to preserve and, if possible, increase the share of government spending on the redistributive package even as total expenditure is contained. This is especially true in a period of adjustment when it is reasonable to expect a general increase in social stress (Mundle 1992). Thus a policy of compressing total government expenditure must be combined with a simultaneous reallocation of public resources in favour of capital expenditure, especially for core activities, and the redistributive package. Practical proposals in this regard need not be repeated here as they have been detailed elsewhere (Mundle and Mukhopadhyay 1991). However, it has to be said that while almost all non-interest items of public expenditure have been reduced in real terms in the recent period, the main burden of expenditure compression in the Indian adjustment programme has so far fallen on the redistributive package and items of capital expenditure (table 9).

This crowding out of public expenditure on the anti-poverty programmes, human resource development and capital formation must be viewed with concern because it is not just a temporary aberration but a continuation of a secular tendency which has been accentuated instead of being reversed in the current adjustment programme. India's poor record in the development of human capabilities and the construction and maintenance of essential infrastructure is as much a cause for India's poor international competitiveness as the over-regulated and over-protectionist policy regime. Continuing neglect of these areas of public action will compromise the long-term growth prospects of the economy apart from their negative impact on current welfare.

5. Some Concluding Remarks

Economic policies are invariably based, at least implicitly, on a theory regarding the operational mechanism of the economy where the policies are to be applied. As Keynes (1936) had observed in a well known passage

Table 8. Per Capita Government Expenditure by Functional Categories: States and Centre (Rupees at 1970–71 Prices)

		1971–72	1975–76	1980–81	1985–86	1986–87	1987–88
1.	Interest payment	14	11	16	29	35	39
2.	Defence	25	26	27	41	40	43
3.	General administration*	36	22	25	36	35	35
4.	Economic services	87	64	82	109	104	101
4.1	Agriculture and allied activities+	33	16	22	25	30	27
4.2	Mining and manufacturing	22	21	23	38	32	30
4.3	Transport	15	10	12	12	12	11
4.4	Energy	9	10	16	22	20	21
4.5	Other economic services	8	7	9	12	10	12
5.	Social services	35	35	49	70	71	75
5.1	Education	20	21	27	37	37	40
5.2	Health	4	5	7	9	9	10
5.3	Housing	4	5	8	14	13	13
5.4	Other social services	7	4	7	10	12	1
6.	Transfers under agriculture and allied activities	1	1	2	2	3	3
Total expenditure		198	159	201	287	288	296

Notes: * Includes relief and miscellaneous expenditure.
+ Excludes transfers.

Source: Mundle and Rao (1992).

Table 9. Central Government Expenditure in Stabilization Period

	Nominal Expenditure[1] (Rs crores)		Average Annual Growth Rate (1990–91 to 1992–93)	
	1990–91 (RE)	1992–93 (BE)	Nominal	Real[2]
1. Interest	21,850	32,000	21.0	9.0
2. Family welfare	793	1,010	12.9	0.9
3. Current transfer to states,union territories and foreign governments	14,684	18,041	10.8	–1.2
4. Health	480	561	8.1	–3.9
5. Other economic services	4,076	4,591	6.1	5.9
6. Defence (including capital)	15,750	17,500	5.4	–6.6
7. Other general services	7,194	7,928	5.0	–7.0
8. IRDP	356	376	2.8	–9.2
9. Education	1,648	1,722	2.2	–9.8
10. Food subsidy	2,450	2,500	1.0	–11.0
11. Employment programmes	2,189	2,176	–0.3	–12.3
12. Capital transfer to core PSUs[3]	4,984	4,534	–4.6	–16.6
13. Other capital expenditure	22,029	19,636	–5.6	–17.6
14. Other subsidy	8,171	6,487	–10.9	–22.9
15. Other social services	63	25	–37.0	–49.0
Total expenditure	1,06,717	1,19,087	5.6	–6.4

Notes: [1] Except for items 6, 12 and 13, all others are items of revenue expenditure only.
[2] Average inflation rate is 12 per cent.
[3] These include railways, road transport, power and coal.

in the Concluding Remarks to the General Theory '. . . the ideas of economists and political philosophers, both when they are right and when they are wrong are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.' The success of particular policies in achieving desired outcomes depends in large measure on how well the underlying theories approximate the actual working of an economy.

In this paper the impact of alternative fiscal policies on the macroeconomic performance of the Indian economy has been analysed with the help of a macroeconomic model which attempts to capture some important pecularities of this highly controlled economy, i.e., the dominant role of administered prices, the nature of the corresponding inflation mechanism, the effect of government intervention on aggregate investment behaviour and the role of money supply in this interventionist policy environment.

Though the analysis has been carried out with reference to the current stabilization programme in India, it has been mainly directed at deriving some long-term lessons regarding alternative fiscal strategies, trade policy, etc. rather than evaluating the stabilization programme itself. In particular the simulations reported for 1992–93 and 1993–94 should be read as attempts to capture the impact of alternative fiscal policies in a stylized form and not as 'forecasts' of macroeconomic performance under the programme. Even in this context, it would be unrealistic to aim at statistically accurate measures of each policy impact in a situation where some of the underlying behavioural relationships could be changing in response to discrete changes in the policy regime. However, since such adjustments are likely to be gradual, not sudden, distortions in the simulation results would be minimal in the short run.

The most important lesson emerging from this exercise is that balance of payments stability cannot be easily restored merely through aggregate demand management and exchange rate depreciation. Strong government intervention to support export growth is essential, particularly keeping in view the prevailing recessionary conditions abroad, the disruption of trade with some of India's major trade partners in the C.I.S. countries, and the protectionist climate in international markets.

If exchange rate adjustment and export promoting industrial policies are assigned to restoring external balance, then domestic macroeconomic policies can be dedicated to the goals of high growth and price stability. The operational context is one where output appears to be demand-constrained, investment is funds-constrained and price formation is dominated by administered pricing policies. The foregoing analysis suggests that in such a context inflation will largely depend on the policy stance on administered prices while growth will primarily depend on the availability of funds for private and public investment.

In controlling inflation, government policy on administered prices is far more important than its policy on the fiscal deficit. The simulation exercises show that if large administered price increases persist, then reducing the fiscal deficit will mainly contain growth, not inflation. On the other hand, if administered price increases are moderated, then the inflation rate will fall despite a fairly large fiscal deficit of, say, 6 or 6.5 per cent of GDP being maintained at the centre. Administered price increases are not always avoidable. For instance, if imported crude prices rise, then an increase in the price of domestic petroleum products is unavoidable sooner or later. However, where there are no such compulsions, the raising of administered prices merely as a means of mobilizing revenue should be avoided. It represents 'money illusion' on the part of government and is self-defeating in the end.

Reducing the fiscal deficit, by itself, may not be very effective in reducing inflation. However, such contraction is now quite urgent for other reasons. Rapid growth of the fiscal deficit has raised the cost and limited the availability of funds for private investment. At the same time, a sharp increase in the burden of public debt has distorted the allocation of government resources in the recent period. Interest on public debt is now one of the largest and fastest growing components of government expenditure. It is already diverting public spending away from capital expenditure, expenditure on social services like health or education and spending on 'merit goods' like subsidized food or the anti-poverty programmes.

Thus considerations of growth as well as equity suggest that the deficit should be reduced.[11] The same considerations also suggest that, in reducing the deficit, greater revenue mobilization would be preferable to expenditure compression. This should be attempted through tax reforms aimed at widening the base of direct taxes, reducing tax shelters, and improving enforcement rather than raising rates.[12] High rates of taxation are socially unacceptable and hence difficult to enforce. There are, however, limits to how far tax reforms can raise the buoyancy of tax revenue or the tax–GDP ratio, which is already fairly high by comparable international standards. Hence fiscal correction will have to depend in part on public expenditure compression.

Here the *composition* of expenditure compression is important. The relevant simulations show that, even in the short run, compression of capital expenditure impairs growth whereas revenue expenditure compression promotes growth. These contrasts would be more pronounced in a longer-term perspective, which also takes into account the supply-side effects of restricted capital expenditure. Within revenue expenditure it is

[11] The deficit that remains should be monetized as far as possible. This would minimize the funds squeeze on private investment and the distorting effect of debt servicing in the allocation of public expenditure without much adverse effect on the inflation rate.

[12] Tax reform proposals for India which follow this approach are detailed in the Interim Report of the Tax Reforms (Chelliah) Committee (GOI 1991). See also Mundle and Rao (1992).

essential to maintain if not expand the real expenditure on (targeted) food subsidy and the anti-poverty programmes in order to ensure that the burden of adjustment is not passed on to the poor in the short run. Similarly, expenditure on social services like education and health must be protected in real terms on considerations of equity as well as growth, since the development of human capabilities is a crucial requirement for sustaining rapid growth.

In the recent period public expenditure on almost all items except interest payments have been cut in real terms. However the sharpest cuts have fallen on precisely those items of expenditure which ought to be protected, i.e., capital expenditure, human resource development and the redistributive package. Hopefully the next round of budgets at the centre and in the states will attempt to reverse this trend.[13]

APPENDIX: ESTIMATION, DATA SOURCES AND LIST OF VARIANCES AND PARAMETERS

The macroeconomic model set out in the main text consists of 31 equations. However, many of these equations are either identities or intermediate equations not used in the final model. Altogether only ten equations required some estimation.[14] Of these, three in particular require discussion. These include (i) estimation of the aggregate supply function in order to determine whether the economy is on the demand constrained segment or the supply constrained segment, (ii) estimation of the corresponding function for inflation, and (iii) estimation of the private investment function.

(i) The Aggregate Supply Function

In the model this function has been defined as either

$$P = P_f \text{ when } Q \leq Q_n \qquad \text{(A1)}$$

$$\text{or } P = P_f + F(Q - Q_n) \text{ when } Q > Q_n \qquad \text{(A2)}$$

In order to run the model empirically it is necessary to establish which segment of the supply function is relevant. The administered floor price level P_f is derived as a function of the weighted average of all administered prices (P_a^*). Hence for $Q > Q^n$ equation A2 may be written as

[13] These lines were written before the presentation of the Union Budget for 1993–1994. Readers will notice that a number of issues underlined here, through not all, have in fact been addressed in the new budget.

[14] These include equation numbers 4, 7, 10, 14, 16, 21 and 28 in addition to the measurement of some ratios in equations 18, 20 and 31.

$$P = a_o + a_1 P_a^* + a_2 (Q - Q_n) \qquad \text{(A3)}$$

substituting Q_n by equation (11) from the main model yields

$$P = a_o + a_1 P_a^* + a_2 [Q - \theta K(t-1)] \qquad \text{(A4)}$$

However θ here is conceptually the optimal capital–output ratio, which may be different from the observed ratio. Hence A4 is rewritten as

$$P = a_o + a_1 P_a^* + a_3 Q/K(t-1) \qquad \text{(A5)}$$

where $a_3 = a_2/\theta$. Since θ is positive, $a_3 \gtrless 0$ when $a_2 \gtrless 0$.

OLS estimates of the parameters of (A5) fitted to data for the years 1975–76 to 1988–89 are as follows (*t*-values in parentheses),

$$P = -67.81 + 0.39 P_a^* + 149.07 \left[\frac{Q}{K(t-1)}\right] \qquad \text{(A6)}$$
$$(-1.24) \quad (22.48) \quad (1.31)$$

$$R^2 = 0.98; \quad \bar{R}^2 = 0.97; \quad D.W. = 1.09$$

The equation was also fitted to a longer time period 1970–71 to 1988–89, with a dummy *(D)* introduced to capture the shocks of drought in the outlier years 1972–73 and 1987–88. In this case the estimated equation is

$$P = -47.09 + 0.38 P_a^* + 116.84 \left[\frac{Q}{K(t-1)}\right] + 9.6 D \qquad \text{(A7)}$$
$$(-1.27) \quad (37.19) \quad (1.52) \quad (2.78)$$

$$R^2 = 0.99; \quad \bar{R}^2 = 0.98; \quad \text{D.W.} = 1.47$$

In both estimated equations (A6) and (A7) the coefficient of $\left[\frac{Q}{K(t-1)}\right]$ turns out to be insignificant, suggesting that the relevant supply function is the demand-constrained segment (A1) rather than the supply-constrained segment (A2). However, this should be treated only as a tentative conclusion. It is possible that the capacity utilization variable appears to be insignificant because its variations are small compared to those in the administered price variable. Also a more disaggregated model may show some capacities to be binding while others are not.

This identification has important implications for the estimated impact of demand management policies. Hence these must also be treated as tentative pending further research. In the segment $P = P_f$ output is demand-determined and the equilibrium price level is largely independent of demand. Shifts in demand will therefore primarily lead to changes in output rather than price. It is appropriate in this situation to normalize the demand function with respect to output (*Q*). The robustness of the result that price is independent of demand can be tested by applying the

Wu-Hausman test in the output normalized demand function (equation 2 in the model).[15]

$$Q = Q(P, A) \qquad \text{(A8)}$$

Applying the test to an expanded version of equation A8 yielded a t-statistic of 0.29 for the predicted price variable, which does not allow rejection of the null hypothesis that price is exogenous in the demand function.

(ii) The Inflation Function

Having identified the economy as lying on the demand-constrained segment of the aggregate supply curve

$$P = P_f \text{ with } Q \leq Q_n \qquad \text{(A1)}$$

the corresponding inflation process is represented by equation (10) of the model

$$\hat{\dot{P}} = \dot{P}_f \qquad \text{(A9)}$$

Hence it is now necessary to estimate the function for determining $\dot{P}_f$ and therefore the inflation rate of equilibrium prices $\dot{P}$.

Recall that $\dot{P}_f$ was defined as the change in floor price level which would follow purely as a consequence of change in administered price increases, other things remaining the same. In other words $\hat{\dot{P}}$ is equal to $\dot{P}_f$ while the latter is a function of the average rate of administered price increases $\dot{P}_a^*$ hence

$$\hat{\dot{P}} = F(\dot{P}_a^*). \qquad \text{(A10)}$$

Accordingly, treating $\dot{P}$ as an observed proxy for $\hat{\dot{P}}$, this was regressed on the average rate of administered price increases $\dot{P}_a^*$ for the period 1970–71 to 1988–89, along with dummies to capture the impact of shocks in outlier years, i.e., D for drought years and D_1 for the Emergency Year 1975–76 when $\dot{P}$ became negative. The estimated function (with t-values in parentheses) is as follows:

$$\dot{P} = \underset{(3.86)}{0.07D} - \underset{(-1.45)}{0.05D_1} + \underset{(8.34)}{0.54\,\dot{P}_a^*} \qquad \text{(A11)}$$

$$R^2 = 0.57;\ \bar{R}^2 = 0.51;\ F(1,15) = 5.77$$

The F-statistic (Lagrange multiplier test of first-order residual serial correlation) shows the presence of serial correlation at the 5 per cent level. Two alternative functional forms were therefore tried to correct for

[15] For a discussion of these issues see Madala (1989).

dynamic misspecification: one introduced the lagged dependent variable $\dot{P}(t-1)$ and the other a lagged independent variable $\dot{P}_a^*(t-1)$. The results are as follows:

$$\dot{P} = \underset{(4.93)}{0.07D} - \underset{(-3.40)}{0.11D_1} + \underset{(2.14)}{0.24\dot{P}_a^*} + \underset{(3.20)}{0.52\dot{P}(t-1)} \qquad \text{(A12)}$$
$$R^2 = 0.75;\ \bar{R}^2 = 0.69;\ F(1,14) = 0.12$$

and

$$\dot{P} = \underset{(5.28)}{0.08D} - \underset{(-3.37)}{0.18D_1} + \underset{(2.70)}{0.29\,\dot{P}_a^*} + \underset{(2.88)}{0.39\,\dot{P}_a^*(t-1)} \qquad \text{(A13)}$$
$$R^2 = 0.72;\ \bar{R}^2 = 0.66;\ F(1,14) = 0.61$$

The higher value of $\bar{R}^2$ would suggest that equation (A12) be chosen over (A13) for policy simulation. This choice is supported also by some other tests for selection between non-nested regression models.

(iii) The Private Investment Function

In the main text it has been explained why the appropriate model of investment behaviour in India is neither a pure accelerator type model nor a neoclassical cost-of-funds model but a funds-constrained model of the form

$$I_p = I_p(S_3, Z^*, M_3) \qquad \text{(A14)}$$

where I_p is nominal private investment, S_3 is gross savings of the private corporate sector, Z^* is the policy-determined gross disbursement of term loans by financial institutions and M_3 is broad money supply.

In the empirical estimation the coefficient of S_3 turned out to be insignificant while the coefficients of Z^* and M_3 are themselves strongly correlated ($r^2 = 0.99$). So are their first differences ($r^2 = 0.91$). This is presumably because under the statutory liquidity ratio provision, bank deposits, a major component of M_3, also constitute a major source of funds for the financial institutions. Because of this multicollinearity problem one of the two variables had to be dropped. Z^* was retained, dropping M_3, since the former had a higher explanatory power in terms of both level as well as first differences.

Regarding the form of the functional relationship between I_p and Z^*, it has to be noted that there is a lag of a few months between the disbursement of funds by the financial institutions and their actual utilization by borrowing firms for investment. This is not only because of transaction delays but also because firms would find it cheaper to temporarily use the term loans for working capital purposes, bank loans available for the latter having a higher interest cost. Therefore it has been assumed that private investment in the current period is partly dependent on funds disbursed during the

previous year and partly on the increase in disbursement level during the current year

$$I_p(t) = I[Z^*(t-1), \Delta Z^*(t)] \qquad \text{(A15)}$$

The above function was fitted for the period 1965–66 to 1988–89 along with three dummies, D, D_1 and D_2, to adjust for abnormal years. The estimated results are as follows:

$$\begin{aligned} I_p(t) = {} & 3147.1 + 9.3892\ \Delta Z^*(t) + 4.7433\ Z^*(t-1) \\ & (7.2683) \quad (9.3686) \quad (17.1276) \\ & + 3331.4D - 2468.6D_1 + 4813.6D_2 \qquad \text{(A16)} \\ & (7.0709) \quad (-3.2038) \quad (4.6239) \end{aligned}$$

$$R^2 = 0.99; \quad \bar{R}^2 = 0.99; \quad D.W. = 2.15$$

Data Sources

The different price indices used in the exercise have been obtained from Chandhok(1990) and procurement price data from Economic Survey (various issues). National Accounts Statistics (various issues) have been used for obtaining time series data on gross domestic product, gross capital formation in private and public sectors, real net fixed capital stock and government consumption expenditure. Data on money supply, high powered money, foreign currency assets of RBI, exports and imports are taken from various issues of the RBI Report on Currency and Finance. Data on government revenue, expenditure and deficits have been taken from various issues of Indian Economic Statistics (Public Finance).

List of Variables and Parameters

Unless otherwise indicated, variables are in nominal values. A dot on a particular variable indicates growth rate of the variable. Exogenous variables and parameters have been estimated from past trends where necessary. Policy instruments have been set for the base run on the basis of policy statements, documents, etc. and perturbed as required for simulation.

Endogenous Variables:

P = Price.
$\hat{P}$ = Equilibrium level of prices.
P_f = Floor price level.
Q = Real output.
$\hat{Q}$ = Equilibrium level of real output.
c^* = Private final consumption expenditure.
A = Aggregate final demand net of private consumption($I+G_1-D$).
I_g = Gross capital formation in the public sector.
I_p = Gross capital formation in the private sector.

I = Total gross capital formation.
I_f = Real fixed capital formation.
G = Government revenue expenditure (all governments).
G_1 = Government consumption expenditure (all governments).
E = Total government expenditure (all governments)
E_1 = Total central government expenditure.
S_1 = Government capital expenditure (all governments).
T = Total revenue (tax plus non-tax for all governments).
F = Fiscal deficit (all governments).
M_3 = Money supply.
H = High-powered money.
F_m = Change in stock of monetized debt.
D = Trade deficit (imports minus exports in rupees).
M = Imports (in rupees).
M_r = Real imports.

Exogenous Variables:

$K(t-i)$ = Stock of fixed capital in period $(t-i)$.
$I_f(t-i)$ = Total real fixed investment in period $(t-i)$.
$T(t-1)$ = Total revenue in period $(t-1)$.
S_2 = Total gross capital formation by non-departmental enterprises.
S_3 = Savings of private corporate sector.
R = Change in net foreign exchange assets of RBI set at rupees zero, 400 crore, 800 crore and 1200 crore per annum corresponding to dollar export growth rates of 5 per cent, 7 per cent, 9 per cent and 11 per cent, respectively in different simulations.
$\dot{X}$ = Growth of exports in dollars set at either 5 per cent or 7 per cent or 9 per cent or 11 per cent in different simulations.
e = Exchange rate assumed constant at Rs 25.88 per US $.
Q_n = Normal capacity output.
$\dot{P}_m$ = Percentage change in dollar price of imports (difference between percentage change in unit value index of imports and exchange rate).

Parameters:

α_1 = Elasticity of equilibrium output with respect to floor price P_f.
α_2 = Elasticity of equilibrium output with respect to capacity output Q_n.
α_3 = Elasticity of equilibrium output with respect to A.
β_1 = Elasticity of equilibrium price with respect to P_f.
β_2 = Elasticity of equilibrium price with respect to Q_n.
β_3 = Elasticity of equilibrium price with respect to A.
θ = Output–capital ratio.

b = Share of public investment in total investment.
τ = Elasticity of real fixed investment with respect to total real investment.
v = Money multiplier.
k = Ratio of public sector gross capital formation (I_g) to total capital expenditure in government (S_1) plus gross capital formation by non-departmental enterprises (S_2.)
δ = Ratio of imports to trade deficit (rupees).

Policy Instruments:

P_a^* = Average of percentage change in administered prices.
h^* = Ratio of change in stock of monetized debt to GDP.
f^* = Ratio of fiscal deficit to GDP controlled through adjustment of the centre's fiscal deficit.
f_1^* = Ratio of centre's fiscal deficit to GDP.
g^* = Ratio of revenue expenditure to GDP.
t^* = Tax buoyancy indirectly controlled through tax reforms.
Z^* = Loans disbursed by government controlled financial institutions.
m^* = Elasticity of real imports with respect to real output indirectly controlled through trade policy, exchange rate variation and tariff reforms.

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