The Real Exchange Rate, Fiscal Deficits and Capital Flows

India: 1981-2000

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India should use the opportunity presented by high reserves and low domestic inflation to now fully open the capital account (with a proviso about borrowing in foreign currency), make the rupee fully convertible and allow it to float freely. For in a world of fluctuating capital flows it is impossible for the authorities to predict, let alone implement, the requisite movements in the nominal exchange rate required for a managed float. If this is done, none of the fears that the authorities seem to have about absorbing capital inflows would be realistic and India could very quickly raise its growth rate, which continues to be suppressed by the misalignment of the real exchange rate.

DEEPAK LAL, SUMAN BERY, DEVENDRA KUMAR PANT

I Introduction

The slowdown in India's growth in the late 1990s led to many demand- and supply-based explanations being offered [see RBI 2002, for a survey and an empirical assessment of these views]. However, most of these explanations are still within an implicit closed economy macroeconomic framework. As was argued in Lal and Joshi (1994), this conventional framework is inappropriate to analyse the macroeconomics of an open economy with substantial capital and other foreign exchange inflows. The so-called 'Australian' balance of payments model [Salter 1959, Corden 1977, Harberger 1982, Lal 1985, 1993: Ch 17] provides a more useful analytical framework, which integrates the real and monetary aspects for a small open economy.

In this paper[1] we extend this model to a growing economy with capital inflows. By incorporating the model of 'financial exuberance' from Lal, Bhide and Vasudevan (2001) to determine the monetary effects of fiscal deficits in India, we provide an alternative explanation for the growth slowdown, and the implications this has for policy.

II The Model

As is well known, the Australian model aggregates commodities into two large groups: traded (T) and non-traded (N). The former are goods whose domestic prices are set by international prices, (PfT, assumed to be given, as the country being 'small' cannot affect its terms of trade) – the nominal exchange rate (e), and any trade taxes and subsidies (t).

Assume that:

– the share of exportables in the composite tradeable good is b, and of importables (1-b), whose foreign currency prices are Pfx and Pfm respectively;

– The fixed tariff-cum-subsidy rates on exports and imports respectively are xs and mc.

The domestic price of the composite tradeable good (PT) will then be given by:

$$PT = e\,[b.Pfx\,(1+xs) + (1-b).Pfm\,(1+mc)] = e.PfT\,(1+t) \quad ...(1)$$

Any excess demand and supply for tradeable commodities is mediated through equivalent changes in the trade account at constant international prices. As the latter are assumed to be constant by hypothesis, changes in PT will depend entirely upon changes in e – the nominal exchange rate.

By contrast, we assume that domestic demand and supply set the price of the composite non-traded good (PN). This composite comprises not only goods that are non-tradeable (like houses and various domestic services), but also those tradeable goods that have been converted into non-traded goods by prohibitive tariffs or binding import quotas.

This yields the key relative price in the Australian model – the real exchange rate (er) defined as the ratio of the domestic prices of non-traded to traded goods.

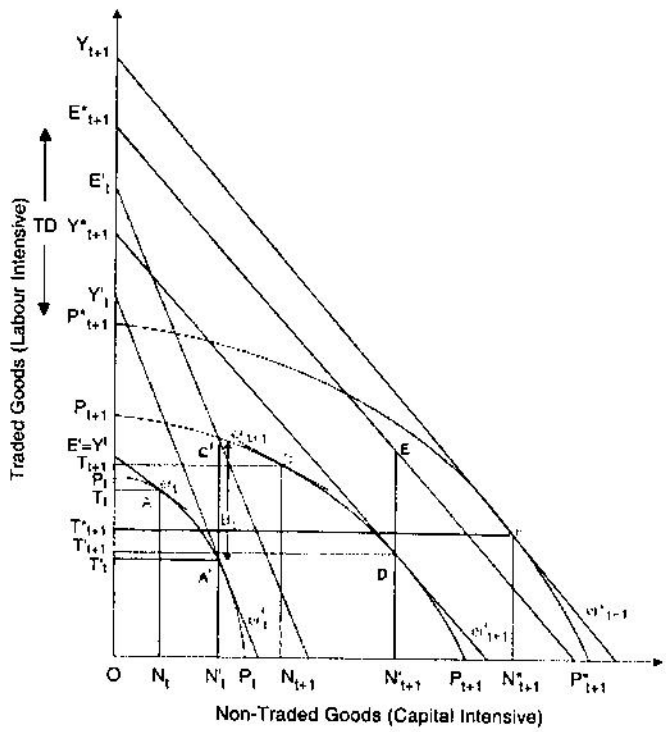
$$er = PN/PT = PN/e.PfT.(1+t) \quad ...(2)$$

If the weight of non-traded goods is (a), and of traded goods (1-a) in the domestic price level (Pd), then:

$$Pd = a.PN + (1-a).PT \quad ...(3)$$

The real exchange rate (er) is the crucial endogenous variable in the Australian model. It should be distinguished from the real effective exchange rate (ep), which is reported by the International Monetary Fund (IMF) and the Reserve Bank of India (RBI). ep is based on the theory of purchasing power parity (PPP) and corrects the nominal exchange rate (e) for the difference between the domestic and foreign price levels (Pd, PfT) as

Figure 1: Australian Model



compared to a chosen base period. Hence ep = Pd/e.PfT. It is related to the real exchange rate er (from equations 1-3) by the relationship: ep = (1+t) [a.er + (1-a)]. The PPP real effective exchange rate (ep) will not be equal to the real exchange rate (er) if there are both traded and non-traded goods in the economy. If there are no non-traded goods (a=0), nor tariffs (t=0), ep=1, and as there are no separate category of non-traded goods, the numerator of er will be the same as the denominator and hence also er =1. Alternatively if there are no traded goods (a=1) then the economy is essentially closed and there can be no meaningful exchange rate which links domestic to external prices. Nor will changes in the real effective rate ep be surrogates for changes in the real exchange rate er.

Figure 1 illustrates the basic model. In figure 1, P_t P_t is the production possibility frontier (PPF) for the output of the two composite commodities, traded, T and non-traded N. The supplies of the two primary factors of production, capital (K_t) and labour (L_t) at time t are assumed to be given. This frontier incorporates any supply side distortions, and hence assumes that unemployment is at the natural level. [see Visaria and Minhas 1991 and Lal 1988 for observations on the concept and measurement of unemployment in India.]

For a set of indifference curves (not drawn) initial equilibrium is at A. The slope of the common tangent to the PPF and the indifference curve tangential to it at A, is the initial real exchange rate er_t. The economy is in internal and external balance with domestic output and expenditure in balance ($OY^t = OE^t$). The output of traded goods is OT_t and of non-traded goods is ON_t.

Suppose next, there is a capital inflow of B_t. This means expenditure will increase above OY^t. The excess demand for traded goods (T) will be met by increased supply at the constant price PT and a trade deficit. The excess demand for the non-traded good will lead, initially, to a rise in its price and thence the real exchange rate er'_t.[2] This will lead to a new equilibrium with the inflow at A', where the supply of non-traded goods rises to ON'_t, and consumption is at C', vertically above A'. Domestic output at A', at the new real exchange rate er'_t will be Y'_t, and expenditure E'_t. The difference is the trade deficit, (TD), which will be exactly equal to the capital inflow of B_t. In the more usual language, absorption of the capital inflow involves both an income and a substitution effect, the latter induced by the different elasticities of supply of traded versus nontraded goods.

The above results follow directly from the national income accounting identities (see Appendix I). Assuming no change in the central bank's net foreign assets

TD = Y-E = X-M = S-I = B

where: Y equals output; E is domestic expenditure; X, M, S, I are exports, imports, saving and investment respectively; and B is the net capital inflow, which includes net factor payments from abroad such as workers' remittances, which are non debt-creating flows, as well as capital flows (such as portfolio and direct investment, and official loan finance) which create liabilities. Thus remittances (private transfers) which are part of the current account will also form part of the capital inflow B, along with the usual net inflows on the capital account.

A number of points are immediately apparent in this comparative static framework. If it is desired that the capital inflows be absorbed into the economy, the real exchange rate er must necessarily appreciate. This can come about through several channels. PN can rise – a relative price shift that will generate a rise in the domestic price level. Alternatively, an appreciation of the nominal exchange rate (e) can occur, leading to a fall in the domestic price of traded goods PT, and therefore the price level (pd).[3] Second, the output of traded goods must fall absolutely and relatively at A' from OT_t to OT'_t. This is unavoidable in the short term if the capital inflows are to be absorbed.

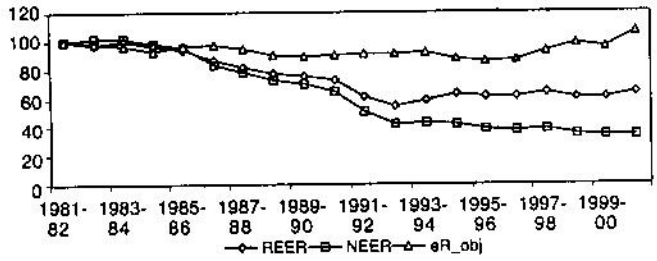
Third, if for some reason the government seeks to avoid the real exchange rate appreciation, say by attempting to maintain the initial real exchange rate er_t, it can only do this by completely

Table 1:Comparison of Different Exchange Rates

Year	Indices				Percentage Change			
	REER	NEER	eR_obj	eR_est	REER	NEER	eR_obj	eR_est
1981-82	100.00	100.00	100.00	100.00	–	–	–	–
1982-83	96.83	101.17	98.51	102.40	-3.17	1.17	-1.49	2.40
1983-84	99.77	101.67	96.26	102.71	3.03	0.50	-2.29	0.30
1984-85	96.54	98.00	92.43	103.60	-3.24	-3.61	-3.98	0.87
1985-86	94.06	95.13	96.26	104.31	-2.57	-2.93	4.14	0.69
1986-87	86.37	82.91	97.32	103.85	-8.17	-12.84	1.10	-0.44
1987-88	81.70	78.39	94.68	103.93	-5.41	-5.46	-2.71	0.07
1988-89	76.96	72.99	90.05	106.64	-5.80	-6.89	-4.90	2.61
1989-90	75.08	69.69	88.96	104.96	-2.45	-4.51	-1.21	-1.57
1990-91	72.34	64.90	90.20	104.15	-3.65	-6.87	1.40	-0.77
1991-92	61.45	50.71	90.99	104.06	-15.06	-21.86	0.87	-0.09
1992-93	54.63	41.97	90.97	100.36	-11.09	-17.23	-0.02	-3.55
1993-94	58.95	43.16	91.56	111.87	7.90	2.83	0.65	11.47
1994-95	63.21	41.89	87.77	111.48	7.23	-2.95	-4.14	-0.35
1995-96	60.89	38.87	85.74	105.91	-3.66	-8.39	-2.31	-5.00
1996-97	61.07	37.64	86.73	113.89	0.30	-1.91	1.15	7.54
1997-98	64.15	38.64	92.94	110.97	5.03	2.67	7.16	-2.57
1998-99	60.72	35.10	98.48	108.08	-5.34	-9.17	5.97	-2.60
1999-00	60.58	34.25	95.48	110.58	-0.24	-2.42	-3.05	2.31
2000-01	63.68	34.31	105.69	108.62	5.12	0.17	10.69	-1.77

REER: Real Effective Exchange Rate of the Indian Rupee using 36 country Bilateral Trade Weights.
NEER: Nominal Effective Exchange Rate of the Indian Rupee using 36 country Bilateral Trade Weights.
eR_obj: Real Exchange Rate (Derived as Ratio of WPI of Non-Traded to Traded Goods).
eR_est: Estimated Real Exchange Rate with full Absorption of Capital Inflows.

Figure 2: Different Indices of Exchange Rate (1981-82=100)



preventing the absorption of the inflows, and ensuring no change in the current account deficit. This will mean that the expenditure (absorption) line will move back to coincide with the output and expenditure line at A. The economy will be back to the initial equilibrium, and the capital inflows will have had no aggregate real effects on the economy. The only change would be a rise in the country's reserves equal to the inflow (B_t) (see equation 9 in Appendix I).

However, to achieve this outcome, domestic macro policies will need to adjust to reflect the capital inflow. Assuming that the capital flows accrue to private residents (rather than government), for these to be fully translated into reserves accumulation the flows need to be saved in their entirety. This can be done either through increased taxation or, more usually, through increased sales of government bonds; the process normally referred to as sterilisation.

Fourth, if the inflows are indeed fully sterilised, the trade deficit by definition will remain unchanged, as in an economy open to capital inflows the trade deficit is necessarily equal to the capital inflows that are absorbed.

Fifth, with the sterilisation of the inflows the increase in investment that would have resulted if they had been absorbed will not take place. This will mean that the capital stock will increase by less than it would have if the inflows were absorbed.

Finally, sterilisation keeps interest rates from adjusting, and encourages further inflows. This can build up political pressures on the maintenance of the nominal exchange rate, making it difficult for the Central Bank to unwind the policy.

Assuming that the inflows are sterilised, and hence do not add to investment, the PPF in the next period t+1 will expand to P_{t+1}, P_{t+1}.[4] If the inflows had been absorbed, investment and thence the capital stock would have been higher, and the PPF would have shifted to P^*_{t+1}, P^*_{t+1}.

We can now examine the alternative equilibria in period t+1 for these two cases. With sterilisation of the inflows in period t, reserves have gone up by B_t. Assume that the same happens to the capital inflows of ED' in period t+1. Then the equilibrium on the P_{t+1}, P_{t+1} curve will be at say D, where an indifference curve is tangential to it, and the real exchange rate is the slope of the common tangent, er_{t+1}. The capital inflow of ED' would again be added to reserves, and this will mean again that the capital stock will rise in period t+2 by less than it could have.

By contrast, if the capital inflows are absorbed by the economy in both periods, the economy would move from A' at time t, to F at time t+1 on the P^*_{t+1}, P^*_{t+1} PPF.

We can thus compare the effects on growth from the lack of absorption of the capital inflow. This is done by comparing the increase in output between periods t and t+1 on the sterilised PPFs from A to D, with that on the non-sterilised PPFs (where the capital inflows are absorbed) from A' to F. This gives us a measure of the growth foregone in each period, ceteris paribus, by not absorbing that period's capital inflows. The ceteris paribus clause, it should be noted, includes the level of reserves accumulated in the previous period from sterilising the inflows. This is the first exercise we will conduct.

The second exercise is to examine the effects of the fiscal deficit on the equilibrium of the economy. Assume that the fiscal deficit is fully monetised. This will mean that domestic expenditure (OE^*_t), measured in terms of tradables, will be greater than domestic output (OY^*_t). It will have the same effects as a capital inflow in appreciating the real exchange rate to er_t, and a trade deficit of TD, which, unlike in the case of a capital inflow, cannot be automatically financed and hence must lead to a loss of foreign exchange reserves.[5]

If, however, the fiscal deficit is entirely bond financed then there will be no shift in the expenditure (absorption) line, the real exchange rate will remain unchanged and the only real effect will be through the crowding out of private investment by public borrowing [Lal, Bhide and Vasudevan 2001]. This crowding out will lower the investment rate and thence the growth of the capital stock below what it would have been without the bond-financed fiscal deficit. The effects of such bond-financed deficit finance on the inter-temporal shift of the PPF will be analogous to the case when capital inflows are not absorbed. That is to say that the shift in the PPF will be less (say to P_{t+1}, P_{t+1}) than if there was no bond-financed fiscal deficit, no crowding out of investment and hence a larger growth of the capital stock. In the latter case there would be a greater shift in the PPF (to say P^*_{t+1}, P^*_{t+1}). Hence, as with a capital inflow that is sterilised, a fiscal deficit that is not monetised will leave the real exchange rate unchanged, but reduce investment, the growth of the capital stock, and the growth rate.

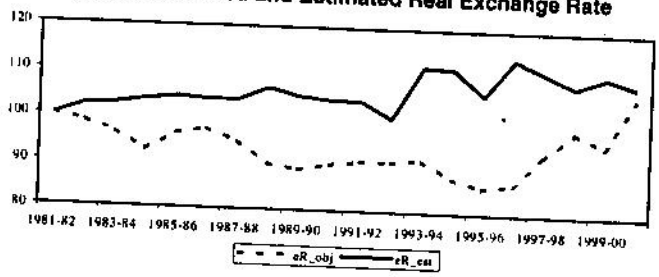
Thus the effects of the fiscal deficit can be decomposed into two parts. The part that is monetised will shift the absorption line and appreciate the real exchange rate. This increase in absorption from fiscal policy will be denoted as ED-excess demand. The part of the deficit that is bond financed will reduce investment and the growth of the capital stock and thence the growth rate of the economy.

Table 2: Data for Regression of Exchange Rate

Year	eR_obj	ED	d(ED)	Bt	d(Bt)
1981-82	100.0	1.87	0.2015	1.5724	-0.8204
1982-83	98.5	0.56	-1.3049	2.3515	0.7791
1983-84	96.3	0.31	-0.2526	2.4488	0.0973
1984-85	92.4	-0.54	-0.8485	2.7318	0.2830
1985-86	96.3	0.20	0.7336	2.9551	0.2233
1986-87	97.3	-0.35	-0.5513	2.8106	-0.1445
1987-88	94.7	-0.98	-0.6263	2.8345	0.0239
1988-89	90.0	-1.78	-0.8025	3.6813	0.8467
1989-90	89.0	-1.59	0.1898	3.1706	-0.5106
1990-91	90.2	-1.05	0.5446	2.9203	-0.2503
1991-92	91.0	-2.31	-1.2607	2.8924	-0.0279
1992-93	91.0	-0.44	1.8654	1.7381	-1.1544
1993-94	91.6	-5.07	-4.6279	5.4615	3.7234
1994-95	87.8	-4.63	0.4442	5.3479	-0.1136
1995-96	85.7	-2.35	2.2763	3.7253	-1.6226
1996-97	86.7	-4.70	-2.3534	6.1738	2.4485
1997-98	92.9	-3.76	0.9460	5.3398	-0.8340
1998-99	98.5	-2.28	1.4784	4.4962	-0.8436
1999-00	96.5	-2.36	-0.0808	5.2462	0.7500
2000-01	105.7	-3.36	-1.0013	4.6698	-0.5764

eR_obj is Index, ED and Bt are percentage of current GDP at Market Prices
d ( ) is absolute change over previous year in variable ( ).

Figure 3: Observed and Estimated Real Exchange Rate



We now can show the growth foregone as a result of the non-absorption of capital inflows and the crowding out of investment due to bond financing of the fiscal deficit. In order to do this we, need to determine for each period the real exchange rate that would be established if capital inflows were absorbed[6] and there was no excess demand from the net effects of fiscal and monetary policy (ED=0), that is the slopes at A and A' in period t, and D and D' in period t+1 in Figure 1. This is done in terms of both a simple regression model and a static formal model outlined in Appendix II (A). Next, we need to determine the potential growth rate if capital inflows are absorbed and there is no fiscal deficit and hence crowding out of investment, that is the points D' and F in Figure 1. The actual growth rate is given by the move from A to D. The potential growth rate is estimated through a simple growth model outlined in Appendix II (B). But, given the data and model uncertainties in India, as well as the lack of any robust estimates of crucial elasticities the following empirical exercise is best seen as being illustrative rather than definitive.[7]

III
The Estimates

We first estimate the actual real exchange rate (er_t) in India for 1981-82 to 2000-01 from the wholesale price index (WPI) series by classifying its components into our two categories of non-traded (N) and traded (T) goods (in Appendix III of Lal, Bery and Pant (2003)).[8] The resulting real exchange series is charted in Figure 2, as er_obj, along with the nominal (NEER) and real effective (REER) exchange rate series available from official statistics. The three series are given in Table 1.

We are aware that the WPI does not include some important non-traded services, such as transport, housing and miscellaneous services, which are part of the non-traded good composite. In Lal and Joshi (1994), two real exchange rate series were estimated. One of these used the WPI, while the other took into account price data on services available from national account statistics. These data were grafted onto the WPI series for prices of non-traded goods. The resulting real exchange rate series did not differ markedly from the series derived solely from the WPI. On grounds of simplicity, the latter is accordingly used in the present exercise.

We next estimated the real exchange rate that would have been established if the capital inflows (B_t) in each period were absorbed instead of being sterilised. In other words we wish to measure the shift from er'_t to er'_{t+1} in Figure 1. This is done using two different methods.

In the first method, we fit a simple econometric equation to estimate the impact on the real exchange rate of the two determinants given in Figure 1, namely, the net capital inflow (B_t) and any excess demand (ED_t) due to the net effects of monetary and fiscal policy. Estimating such an equation requires establishing series for both B_t and ED_t.

In our definition of B_t we include not only net flows on the capital account of the balance of payments but also transfers (mainly workers remittances) "above the line" in the invisibles account. These remittances have been large and their officially measured scale has also been affected by the legislation on imports of gold. As discussed later, one reason for including these remittances is that they can be the source of 'Dutch disease'-type effects through their effect on the real exchange rate. Our estimates of B_t, include both these components. These are given in Table 2, as ratios to GDP at market prices.

We then constructed a series for ED_t (see Lal and Joshi (1994: p 10) for the derivation of ED) from the national income accounting identities as:

$ED_t = (M_t - X_t) - B_t$;

That is the trade deficit (goods)[9] less capital inflows, inclusive of remittances. The resulting series is given in Table 2 (as a percentage of GDP at market prices).

We are now in a position to estimate the relationships between these three series. We expect both B_t and ED_t to be associated with an appreciation of the real exchange rate. This is what is reflected in the move from er_t to er'_t in Figure 1. The estimated equation linking er_t, B_t and ED_t was:

$$er_t = 87.6 + 3.08\ B_t + 3.05\ ED_t \qquad \text{...(R.1)}$$
$$(1.62) \quad (2.25)$$

$R^2 = 0.26$; adjusted $R^2 = 0.18$; F= 3.119; figures in brackets are t statistics; N=20.

The signs are as expected but the coefficient of B_t is not significant at the 5 per cent level while that of ED_t is significant. Though not robust,[10] we can use this equation, to estimate er'_t by controlling for the effects of excess demand on the real exchange rate. The estimated er'_t from R.1, neutralising for the effects of ED_t (i e, assuming that there is no excess demand stemming from fiscal and monetary policy), is shown as er_est in Figure 3 and in Table 1.

The second approach is to estimate er'_t from our static model (A) of Appendix II. These results are reported in Appendix III Table A-1 (est_er1). There was not much of a difference between the two alternative sets of estimates. So, as the model-based estimates, faut de mieux, had to depend upon guesstimates of crucial elasticities, we prefer to take the estimates based on R1 as our best estimate of er'_t – the real exchange rate that would result/be needed if the capital inflows were fully to be absorbed in each period.

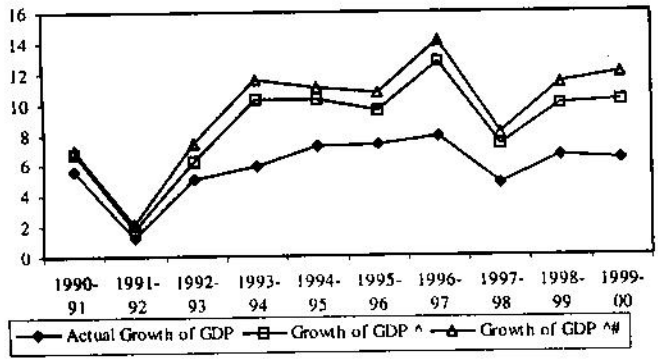
Table 3: Growth under Various Alternatives

Year	Actual Growth of GDP	Growth of GDP ^	Growth of GDP ^#
1990-91	5.57	6.73	7.03
1991-92	1.30	1.80	2.10
1992-93	5.12	6.25	7.45
1993-94	5.90	10.30	11.51
1994-95	7.25	10.25	11.02
1995-96	7.34	9.55	10.68
1996-97	7.84	12.73	14.14
1997-98	4.76	7.31	8.03
1998-99	6.57	9.99	11.31
1999-00	6.37	10.15	11.94

Growth of GDP ^: Growth of Economy if all Capital Flows are Absorbed by Economy.

Growth of GDP ^#: Growth of Economy if all Capital Flows and Crowding out of Private Investment by Bond Financed Fiscal Deficit are Absorbed by Economy.

Figure 4: Growth under Various Alternatives



The difference between the actual real exchange rate (eR_obj) and the estimated real exchange rate (eR_est) shows the degree of real exchange rate misalignment in each year due to lack of full absorption of the capital inflows (Figure 3). In the 1990s when there was an increase in net capital inflows, the net effect of fiscal and monetary policy (including sterilisation) was a large disabsorption (-ED). This can be seen as equivalent to a policy of deflation designed to prevent the absorption of the inflows and the accompanying required real exchange rate appreciation.

We next estimated the growth foregone in the 1990s due to this policy of neutralising inflows by building up foreign exchange reserves. In order to do this, we estimate the growth that would have occurred in each year if ceteris paribus, the inflows of that year were not sterilised but were instead invested. The actual growth rate (movement from A to D in Figure 1) is given from the official data. From this we can also determine the actual savings-investment gap (S-I) as equal to the trade deficit (TD= X-M).

If the capital inflows had been fully absorbed, the trade deficit and hence the S-I gap would have increased by B. Hence, *assuming unchanged domestic savings, and no sterilisation of the capital inflows*, an *upper bound* estimate of the investment forgone, by not absorbing the inflows, will equal B.[11] This allows us to estimate the changes in the capital (K) and labour (L) ratios (K* – L*) with and without the absorption of the capital inflows. This is done in Appendix III, Table A-3 from the reduced form equation for the growth rate (Y*) derived in the growth model in Appendix II (B):

$$Y^* = A.\ [(N/Y)/\ det.lam]\ (L^* - K^*) \qquad ...(4)$$

where, $x^* = dx/x$; N/Y = share of non-traded goods in output; det.lam = determinant of the shares of the two goods in the labour and capital stock, and A= [(1-ed)/(es +ed)], with ed= elasticity of substitution in demand between N and T, and es= elasticity of substitution in supply between N and T.

As these elasticities have not been estimated for India, we followed the following procedure. For the actual growth rate Y*act, we have the data for the actual (L*–K*) and also estimates of the parameters N/Y and det.lam. So from (4) we can estimate the implied value of A. Using this derived value of A for each year we can then determine the potential growth rate Y* for each year when the capital inflows are absorbed and hence K* is higher. This yields the figures for growth of GDP^ in Table 3.[12]

Next we take account of the effects on growth of the crowding out of investment by the bond-financed fiscal deficit. In Lal, Bhide and Vasudevan (2001) we have estimated the crowding out of investment by the fiscal deficits of the 1990s. These results give us estimates of the increase in the capital stock in the absence of such crowding out (Appendix III Table A-2). When this estimate is added to the increase in the capital stock that is assumed to have occurred if capital inflows had been absorbed, we get the potential K* and hence Y* if there had been no (bond-financed) fiscal deficits and full absorption of capital flows. This yields the figures for GDP^# in Table 3.

Figure 4, charts the actual growth rates of GDP in the 1990s and the potential growth rates had capital inflows been absorbed (G^) and additionally if there was no crowding out of investment by the bond financing of the fiscal deficit (G^#). As is obvious, there has been a substantial loss of potential growth as a result of both lack of absorption of capital inflows and the fiscal deficit. But, the loss due to the failure to absorb the capital inflows and the consequent build up of foreign exchange reserves is much greater. It should be noted that the estimated G^ for each year takes the foreign exchange reserves built up in the previous year as given. Thus in 1998-99, the reserves at the beginning of the year are taken as given, and the difference between the actual growth rate of 6.57 per cent and the potential G^ of 9.99 per cent is attributable exclusively to the failure to absorb the capital inflows of that year.[13]

What this analysis suggests is that, under the assumptions made above, the implications for investment (and thereby for growth of potential output) of the decision to divert capital inflows into reserves could be potentially very large. Much attention is paid, and rightly so, to the impact of the fiscal deficit on crowding out private investment. The above analysis suggests there are equally significant growth losses attributable to the gains that have been foregone due to the failure to absorb the capital inflows, where policy action is less constrained by political pressures in comparison with those involved in reducing the fiscal deficit.

IV
Policy Implications

From our analysis it is apparent that growth could have been faster had the government chosen to absorb the external resources available to the economy in the 1990s. While explicit quantification has not been attempted in this paper, there can be little doubt that faster growth would in turn have improved the revenue position of both the central and state governments. Such improvement in turn would have both strengthened public savings, and led to less crowding out of investment through bond issue by the government.

The net effect of government policies has been to maintain a virtually constant real exchange rate (eR_obj in Table 1 and Figure 2) in the face of significant non-trade inflows (Bt in Table 2), and to let the inflows accumulate in the central bank's reserves. Given the trauma of the balance of payments crisis of 1991, and the sanctions imposed after the Pokharan explosions, the motives for this foreign reserve build up are understandable [Reddy 2002], The continuance of this policy however would seem highly questionable. With foreign exchange reserves currently able to finance over a year of imports, and short-term debt repayment obligations under control, any precautionary motive for putting the inflows into reserves has disappeared. A large stock of reserves can itself be an invitation to a speculative attack, as it serves to signal that the central bank is prepared to use its reserves to defend the exchange rate. Finally, RBI protestations to the contrary, there can be no question that carrying a large

reserves stock is a source of a quasi-fiscal deficit, which further adds to an already parlous fiscal situation at the centre.

For all these reasons, the government should now put in place policies that would permit greater absorption of these inflows. On the assumption that such absorption would lead to greater investment, this would lead to a substantial boost to the growth rate with the beneficial fiscal and poverty benefits that could be expected to ensue.[14]

The concern is sometimes expressed that absorption of the non-trade flows highlighted above, would cause a 'Dutch disease' phenomenon, particularly when taken together with India's buoyant software exports. Strictly speaking, the 'Dutch disease' can arise when an economy enjoys a foreign exchange windfall that allows domestic entities to spend beyond their inter-temporal budget constraint. Where an economy (e g. Saudi Arabia or Kuwait) is able to rely on such revenues indefinitely, it makes sense for the economy to adjust accordingly.

Capital flows have some of the same windfall effects as these 'gifts'. When they are received, they allow domestic expenditure to be greater than earned domestic factor incomes, with the reverse pattern when they are repaid.[15] That is why they are necessarily associated with real exchange rate appreciation and trade/current account deficits if they are absorbed.

On whether they should be absorbed or not, as mentioned earlier (Note 3), the question varies between the private and public sector. On the usual assumption that private agents can take care of themselves, we should not try and offset their actions (unless there are clear externalities). Even when such flows are temporary, if they accrue to the private sector, private agents should, in general, be expected to internalise the temporary nature of these flows in their saving/investment decisions. The main concern for policy is to ensure that no actions are taken (such as exchange rate or repayment guarantees) which distort incentives for the private management of these flows. It is for public flows (and those accruing to the public sector through say mineral rents) that problems can arise because of irrational, often pro-cyclical government behaviour.

While capital flows and remittances can potentially be a source of 'Dutch disease' effects, foreign exchange revenue from software exports is no different from any other service export, such as tourism. Tourism exports have been a significant and enduring element in the balance of payments of many countries at different moments in their development: the cases of Spain and Thailand are well known. Whether a country happens to export cars rather than software depends upon a host of factors determining its comparative advantage at the relevant date. Revenues from the latter should be as welcome as from the former. In due course comparative advantage will shift to other sectors.

If the build-up of foreign exchange reserves for precautionary motives is now sufficient, what other reasons could there be for the reluctance of the government to boost growth by absorbing capital inflows? One could be a fear of inflation. For as Figure1 and our estimates both show, the real exchange rate would have to appreciate. With stability of the nominal exchange rate, this appreciation of er can only come about though a rise in prices of non-traded goods PN. If however the nominal exchange rate is allowed to appreciate, then the requisite real exchange rate appreciation can come about with a fall in the price of traded goods PT, and therefore, ceteris paribus, with a fall in the domestic price level Pd (see (3)). The inflationary consequences of absorbing the inflow are thus clearly linked to the choice of exchange rate regime, and are not intrinsic to the decision to absorb the inflows.[16]

Perhaps the government is then chary of appreciating the nominal exchange rate because it does not like the resulting effects on the traded goods sector. But, as Figure 1 makes clear, if the capital flows are to be absorbed, the traded goods sector must initially necessarily shrink relative to the non-traded. This shrinkage is the outcome of the different elasticities of supply and of demand of the two groups of commodities. As such it is unavoidable and is an equilibrium phenomenon. Nor will the appreciation of the nominal exchange rate necessarily create a balance of payments problem. This is an obsolete view based on the world, as it was in the Bretton Woods era, on a quasi-fixed exchange rate standard with little or no capital mobility allowed by the authorities. One of the central messages of the theory of open economy macroeconomics in a world of capital mobility is that the current account balance is largely determined by capital flows, and thence the savings-investment balance of the economy. Given these, it can only temporarily be affected by changing the nominal exchange rate, through whatever short-run impact the latter has on real wages. The more important effect of nominal rate changes is to determine the required change in non-traded goods prices needed to adjust to the necessary new equilibrium real exchange rate.

The real exchange rate appreciation needed to absorb capital inflows will imply greater competition (and reduced profitability) for existing producers of the traded goods sector, including both manufacturing and agriculture, requiring them to adjust either in scale or in productivity. Import liberalisation in India has largely consisted of converting goods into tradeables which had been made non-tradeables by import controls. These sectional interests would therefore resist this appreciation just as they resisted import liberalisation. It is not surprising that Indian industry should therefore now look upon an undervalued nominal exchange rate as providing them with what has been termed 'exchange rate protection' [Corden 1974].

This new form of protection, 'exchange rate protection',[17] needs to be resisted as fiercely as the old-fashioned form which damaged India's growth prospects, and the living standards of its poor, so shamefully for nearly half a century. It is true that in the previous era of fixed exchange rates and widespread capital controls many south-east Asian countries (and Japan in the immediate post-war decades) relied on exchange rate protection of their industry. It has also been argued (Surjit Bhalla, among others) that the Chinese export boom of the 1990s was powered by deliberate undervaluation of the Yuan. This method of protection is less distortionary and hence harmful to growth performance than the system of selective import controls that India adopted. But, with the global integration of capital markets and the increasing role of cross-border capital flows in supplementing domestic savings and investment, this form of protection can only lower the growth of the economy below its potential.

The political impediments to carrying out a growth-promoting policy agenda thus still remain. Indian industrialists still want the profitability of their enterprises to be artificially maintained by an undervalued exchange rate. This requires either shutting out capital inflows or equivalently putting them unproductively into the central bank's reserves. Just as India is slowly and painfully giving up a system of import controls which greatly damaged its growth performance, it should not now succumb to another form of protection, which though less distorting,

nevertheless has substantial costs in terms of growth foregone. Such a system would also be just as anti-consumer as the set of protective policies that preceded it. Furthermore, as the experience of several successful industrial trading countries (Germany, Switzerland, and the US) indicates, a strong currency is not detrimental to a successful productive or exporting sector.

Given these goals and the current context, what would be a sensible set of monetary and exchange rate policies for India? As is universally recognised, reducing and eventually eliminating the fiscal deficit is important. Given political constraints, and in the absence of an external crisis (which at present seems unlikely), major gains are unlikely in the short run, although for both substantive and signalling reasons the movement toward fiscal consolidation must be maintained. As shown in Lal, Bhide and Vasudevan (2001) India has followed an almost textbook monetarist macroeconomic policy. Given a (politically determined) fiscal deficit, the non-primary deficit has been financed by issuing bonds, only monetising the relatively small primary deficit. Such bond financing of interest is only sustainable if the interest rate paid on the debt is less than the growth rate of the economy. Given the political constraints which prevent fiscal reform, as well as those which retard improvements on the supply side of the economy (the so-called second-generation reforms), the analysis above suggests there remains scope for a substantial improvement in growth performance by absorbing the inflow of capital. The additional growth this permits will help keep the internal debt sustainable.

We therefore take the primary fiscal deficit as a given. In our view, the levels of reserves are also now comfortable, indeed excessive, so there is no need to build up reserves any further. Under these circumstances, what monetary and exchange rate policies are appropriate to boost growth?

Under current policies the RBI intervenes in the (FX) market to purchase foreign exchange and again intervenes (in the debt and money markets) through bond sales to mop up or sterilise the monetary consequences of its foreign exchange market intervention. If the RBI wishes to continue purchasing in the FX market, (which we do not favour) it should stop sterilising the inflows; that is to say, that it should abandon pursuit of any reserve money target. This would increase the money supply, reduce interest rates and lead to the requisite real exchange rate appreciation through price increases. As the latter is an equilibrating phenomenon, it should not be resisted. This prescription would also mean that those who have argued on Keynesian lines for a monetary expansion to reactivate the economy are partially right but for the wrong reasons. The money supply would indeed expand (and interest rates come down) if the inflows were not sterilised, and the consequent absorption of the capital inflows would boost growth. But this is very different from Keynesian pump priming which by itself, without capital inflows being absorbed, would not (as the excellent empirical analysis in RBI (2002) shows) give a sustainable boost to growth.

If the ensuing rise in non-traded goods prices and hence the inflation rate is disliked, the necessary real exchange rate appreciation could be allowed to occur through an appreciation of the nominal exchange rate. As the most recent experience in India seems to demonstrate, such an appreciation reduces both inflation and interest rates, and can be expected in time to moderate the inflow of hot money.

Thus, in terms of the macro policy mix, what is called for is the replacement of a loose fiscal/tight money mix with a move toward mild tightening of fiscal policy (measured in terms of the primary deficit) and looser monetary policy. The latter can be achieved either by targeting the exchange rate (and letting the monetary base be determined endogenously) or by targeting the monetary base (and letting the nominal exchange rate be determined in the market), but not by both. As is well known, professional opinion increasingly favours of the latter framework for emerging markets, namely, combining a floating exchange rate with inflation targeting (or some equivalent nominal anchor).

The next step should be to pay off the short-term debt denominated in foreign currency. As the main precautionary reason for holding reserves and therefore sterilising inflows has been the fear of an Asian type of crisis when foreign capital suddenly leaves, it is worth considering the maintenance of a temporary ban on borrowing by domestic residents in foreign exchange.[18] This is for the following reasons. In principle, private agents should be allowed to choose whatever form they want to hold their assets and liabilities. There is no issue of public policy if some of their assignments in global capital markets turn sour, as these, by hypothesis, are private transactions.

The various debt crises in emerging markets have shown that this presumption cannot be sustained because of reasons of global political economy. All the emerging debt crises have arisen because of foreign borrowing by domestic residents in foreign exchange, either in the form of bank lending in the 1980s or bond financing in the 1990s. As countries have learnt the lessons of the 1980s and cut back on sovereign borrowing, they have nevertheless found that, even private borrowing by residents has been treated as carrying an implicit sovereign guarantee. Starting with Chile in the 1980s and in Indonesia in the 1990s, this private debt has had to be assumed by the government when this borrowing turns sour because, say, for the need to devalue a quasi-fixed exchange rate. This is because of the pressure that foreign lenders are able exercise through the international financial agencies. So there may be an externality, which could make a ban on borrowing denominated in foreign currency desirable for the near future.

By contrast the other major forms of capital flows – portfolio equity investment and foreign direct investment[19] – bear both the foreign exchange and income risks associated with foreign lending, as long as the nominal exchange rate is flexible. There can be no justification for limiting these flows.

What if these flows are volatile? That should be of no concern as long as the nominal exchange rate is flexible. For if the capital leaves, the exchange rate will depreciate and inflict a capital loss on those fleeing, while the balance of payments will necessarily be equilibrated by the endogenous change in the nominal and real exchange rate.

This suggests that India should use the opportunity presented by high reserves and low domestic inflation to now fully open the capital account (with the proviso about borrowing in foreign currency), make the rupee fully convertible and allow it to float freely. For in a world of fluctuating capital flows it is impossible for the authorities to predict, let alone implement, the requisite movements in the nominal exchange rate required for a managed float.

If this is done, none of the fears that the authorities seem to have about absorbing capital inflows would be realistic, and India could very quickly raise its growth rate, which continues to be suppressed by the misalignment of the real exchange rate.

Appendix I

Macroeconomic Accounting Identities in an Open Economy

In this appendix we set out the basic accounting identities, which must hold in an open economy, based on Dornbusch (1980).

We start with the identity for the balance of payments, which consists of the current account (CA), the capital account K and the change in net central bank reserves (foreign assets) (NFA). These must sum to zero. Hence,

$CA + K - \Delta NFA \equiv 0$, or (1)

$\Delta NFA \equiv CA + K$ (1a)

From the balance sheet of the monetary authorities (the central bank) we have its assets: the net foreign assets (NFA) and net domestic assets or domestic credit (DC). Its liabilities are high powered money (H). Hence, the balance sheet identity:

$NFA + DC \equiv H$, or (2)

$\Delta NFA \equiv \Delta H - \Delta DC$ (2a)

The current account of the balance of payments is given by the goods and services trade surplus/deficit (X – M) and net factor payments from abroad (R). So,

$CA \equiv X + R - M$ (3)

The gross output in an open economy is the sum of spending on consumption (C), investment (I) and government (G) plus net exports (X-M). Hence,

$Y \equiv C + I + G + (X - M)$ (4)

Total spending (final demand) or absorption by domestic residents (E) is defined as:

$E \equiv C + I + G$ (5)

Substituting identity (5) in (4) gives the identity:

$Y \equiv E + (X - M)$, or

$Y - E \equiv (X - M)$ (4a)

This is a fundamental identity used for instance in our Figure 1, which shows that the trade deficit ($TD \equiv (M - X)$) must equal the excess of domestic absorption over national output (E – Y).

Next, subtract net taxes (taxes less domestic transfers) (T), and add net foreign transfers (net factor payments) (R) to both sides of identity (4). This yields the identity:

$Y + R - T \equiv C + I + (G - T) + (X + R - M)$ (6)

The left hand side gives disposable income of domestic residents. On the right-hand side, in addition to consumption and investment, we have the government budget deficit and from identity (3) the current account position (CA).

Private sector savings (Sp) is defined as disposable income less consumption:

$Sp \equiv Y + R - T - C$ (7)

Substituting (7) in (6) and making use of (3) we get the basic open economy macroeconomic identity:

$CA \equiv (Sp - I) + (T-G)$ (8)

The current account surplus is identically equal to the net surplus of savings of the private and of the public sector (budget surplus). Aggregating private (Sp) and public savings (T-G) into total domestic savings (S) yields the identity:

$CA \equiv S - I$ (8a)

Using identities (1a), (3) and (4a), we have the basic identities on which Figure 1, illustrating the Australian model, is based:

$(Y - E) \equiv (X - M) \equiv \Delta NFA - (K + R)$ (9)

so the trade deficit $\equiv -(X-M)$, must be equal to the excess of domestic expenditure (absorption) over output, and this in turn will be equal to the difference between the change in net foreign assets (Δ NFA) and the capital inflow (denoted by B in our paper) = K + R.

These basic accounting identities must hold. They provide consistency requirements. One cannot say that any one sectoral balance is determined by the others. They are all simultaneously determined by the general equilibrium of price and income determination.

We can now look at two alternative (comparative static) outcomes in terms of these identities. In the first case we assume that the capital inflows ($B \equiv K + R$) are sterilised. The mechanism for this is provided by identity (2a) for the central bank. As B comes into the country, it is exchanged for domestic currency which raises high powered money H. The monetary authorities then reduce this increase in H through open market operations (in order to meet their high powered money targets) by selling their holdings of government debt which reduces DC (net domestic assets) by an equivalent amount. So the net effect will be that the NFA will go up by the amount of the inflow B, and there will be no change in H but an equivalent reduction in DC. However, in order to induce the domestic public to hold this additional debt, other things being equal, domestic real interest rates would have to rise, preventing the increase in domestic expenditure needed to absorb the capital inflows K.

As NFA has gone up by the capital inflow ($B = K + R$) from (9) it must be the case that there will be no change in the trade deficit or in the difference between domestic output and expenditure. As shown in Figure 1, the economy will remain at point A.

In the second case we assume that there is no sterilisation of the deficit. From (2a), H will go up to match the conversion of the foreign currency inflow B into domestic currency and there will be no change in NFA. Hence in identity (9) $\Delta NFA=0$, and the trade deficit (M–X) will equal the inflow (K + R) and this will also be equal to the excess of domestic expenditure/absorption over output (E–Y). In Figure 1, the economy will be at point C', and A' with domestic expenditure E'_t being greater than domestic output Y'_t, the difference also being equal to the trade deficit A'C' which is also the capital inflow B.

Thus, there can be no argument about the fact that non-sterilised inflows must necessarily lead to an increase of domestic expenditure over output. From identity (5) the increase in expenditure allowed by the capital inflow will allow some increased consumption, investment and government expenditure.

As long as part of the unsterilised inflows are saved and invested, again incontrovertibly, the growth rate must go up.

Appendix II

The Algebraic Models

(A) The Static Case

To determine the money price of non-tradable (P N) for any given level of foreign borrowing (B) (the movement from A to A' and from D to D' in Figure 1), we can formalise a small economy macroeconomic model as follows:

The demand (Nd) and supply (Ns) for the non-traded good is given by:

$Nd = a0 - a1\,(PN - PT) + a2Y + a3B + a4\,(Ms - Md)$ ...(A.1)

$Ns = b0 + b1\,(PN - w)$. ...(A.2)

Nd= Ns ...(A.3)

Where Y is domestic output at market prices, w is the money wage rate, Ms the supply of money, and Md the demand for money.

The demand (Td) and supply (Ts) of traded goods, and the balance of payments, are given by:

Td= a0–a1 (PT–pN) +(1–a2) Y+(1–a3) B +
(1–a4)(Ms–Md) ...(A.4)

Ts= c0 +c1 (PT–PN) ...(A.5)

B= Td–Ts ...(A.6)

Y= Ns +Ts ...(A.7)

From A.1 to A.3 and substituting for Y in A.1 from A.2, A.5 and A.7, yields an expression for the determinants of PN:

PN=constant+[(b1 (1–a2)–a2c1)/(a1+b1 (1–a2)] w+[(a1+a2c1)/(a1+b1 (1–a2))] PT+ [a3/(a1+b1 (1–a2))] B + [a4/(a1 + b1 (1–a2))] (Ms–Md) ...(A.8)

Normalising the initial prices (PN, PT) and the money wage w at unity, dPN, dPT and dw represent percentage changes in A.8. The required change in PN, assuming dw=dPT=d(Ms–Md)=0, and N=Nd=Ns, and that nd and ns are the elasticity of demand and supply of non-traded goods we have from A.1 and A.2 that:

A1=Nd.nd; b1= Ns.ns.

Making use of A.3 after substituting for substituting for a1 and b1 as above, and dividing the numerator and denominator of A.8 by output Y yields,

PN* =[(a3. Y/N) / (nd +ns (1–a2))] dB/Y ...(A.8a)

Where x* = dx/x and a2= marginal propensity to spend on non-traded goods.

In Appendix III, Table A-1, we have estimated PN* for each year given that year's capital inflow B. We have assumed that the marginal propensity to spend on non-traded goods, a2, is equal to the share of non-traded goods in the wholesale price index WPI. The elasticity of demand for non-traded goods, nd, will be given by:

Nd + (1-share in expenditure of non-traded goods) x (elasticity of substitution between non-traded and traded goods)

We know the value of a2, but have nothing to go on for the elasticity of substitution between traded and non-traded goods. Harberger (1982) argues that the elasticity of substitution between two such large aggregates without good substitutes between them will lie between 0.5 and 1.0. We have taken the lower value of 0.5 We have nothing at all to go on for the value of ns, and have guess estimated this as shown in the Appendix III Table A-1. The resulting estimates of PN* are then derived, which give the value of the real exchange rate in each year if the capital inflows are absorbed (the slopes at A' and D' in Figure 1)

Appendix III Table A-1: Data Set for Estimation of Real Exchange Rate from Static Model

Year	Y/N Ratio	a2	Sigma d	ns1	ns1N	ns2	nd	a3	g1	g1N	g2	d(Bt)	erp_obj	erp_1	erp_2	est_er1	est_er2	er_obj	Bt	d(ED)
1980-81	1.0412	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.07	2.07	0.89	-	-	-	-	-	-	-	-	-
1981-82	1.0397	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.07	2.07	0.89	-0.82	-	-2.65	-2.53	100.0	100.0	100.0	1.5724	0.2015
1982-83	1.0376	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.07	2.07	0.89	0.78	-1.49	2.51	2.40	102.5	102.4	98.5	2.3515	-1.3049
1983-84	1.0358	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.06	2.06	0.89	0.10	-2.29	0.31	0.30	102.8	102.7	96.3	2.4488	-0.2526
1984-85	1.0349	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.06	2.06	0.89	0.28	-3.98	0.91	0.87	103.8	103.6	92.4	2.7318	-0.8485
1985-86	1.0338	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.06	2.06	0.88	0.22	4.14	0.72	0.69	104.5	104.3	96.3	2.9551	0.7336
1986-87	1.0321	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.05	2.05	0.88	-0.14	1.10	-0.47	-0.44	104.0	103.8	97.3	2.8106	-0.5513
1987-88	1.0306	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.05	2.05	0.88	0.02	-2.71	0.08	0.07	104.1	103.9	94.7	2.8345	-0.6263
1988-89	1.0282	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.05	2.05	0.88	0.85	-4.90	2.73	2.61	107.0	106.6	90.0	3.6813	-0.8025
1989-90	1.0291	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.05	2.05	0.88	-0.51	-1.21	-1.65	-1.57	105.2	105.0	89.0	3.1706	0.1898
1990-91	1.0277	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.05	2.05	0.88	-0.25	1.40	-0.81	-0.77	104.3	104.1	90.2	2.9203	0.5446
1991-92	1.0279	0.7534	0.5	0.5	0.5	1	0.1233	0.75	2.05	2.05	0.88	-0.03	0.87	-0.09	-0.09	104.3	104.1	91.0	2.8924	-1.2607
1992-93	1.0560	0.6965	0.5	0.5	0.5	1	0.1518	0.75	2.27	2.27	0.93	-1.15	-0.02	-3.73	-3.55	100.4	100.4	91.0	1.7381	1.8654
1993-94	1.0543	0.6965	0.5	0.5	0.5	1	0.1518	0.75	2.27	2.27	0.93	3.72	0.65	12.02	11.47	112.4	111.9	91.6	5.4615	-4.6279
1994-95	1.0540	0.7168	0.5	0.5	0.5	1	0.1416	0.75	2.21	2.21	0.92	-0.11	-4.14	-0.37	-0.35	112.0	111.5	87.8	5.3479	0.4442
1995-96	1.0523	0.6251	0.5	0.5	0.5	1	0.1874	0.75	2.52	2.52	0.97	-1.62	-2.31	-4.10	-5.00	107.4	105.9	85.7	3.7253	2.2763
1996-97	1.0495	0.5934	0.5	0.5	0.5	1	0.2033	0.75	2.65	2.65	0.99	2.45	1.15	6.50	7.54	114.4	113.9	86.7	6.1738	-2.3534
1997-98	1.2895	0.4932	0.5	0.5	0.60	1	0.2534	0.75	3.92	2.79	1.30	-0.83	7.16	-3.27	-2.57	110.7	111.0	92.9	5.3398	0.9460
1998-99	1.2736	0.4419	0.5	0.5	0.60	1	0.2790	0.75	4.32	2.98	1.32	-0.84	5.97	-3.65	-2.60	106.6	108.1	98.5	4.4962	1.4784
1999-00	1.8044	0.3425	0.5	0.5	0.75	1	0.3287	0.75	7.90	3.21	2.02	0.75	-3.05	5.93	2.31	112.9	110.6	95.5	5.2462	-0.0808
2000-01	1.7774	0.3262	0.5	0.5	0.75	1	0.3369	0.75	8.17	3.23	2.01	-0.58	10.69	-4.71	-1.77	107.6	108.6	105.7	4.6698	-1.0013

erp_1 is change in exchange rate using ns and nd.
erp_2 is change in exchange rate using equation (R1).

Appendix III Table A-2
Estimates of the Increase in the Capital Stock with Full Absorption of Capital Inflows and,without Bond Financing of Fiscal Deficit

Year	Lambda LN	Lambda KN	N/Y	K* - L*	K*^ - L*	K*^# - L*	Lambda	Growth of GDP	A	Growth of GDP ^	Growth of GDP ^#
1990-91	0.9451	0.9944	0.9730	4.15	5.01	5.24	-0.049	5.57	0.068	6.73	7.03
1991-92	0.9436	0.9943	0.9729	2.47	3.42	4.01	-0.051	1.30	0.027	1.80	2.10
1992-93	0.9393	0.9583	0.9470	2.83	3.46	4.12	-0.019	5.12	0.036	6.25	7.45
1993-94	0.9394	0.9586	0.9485	2.94	5.12	5.72	-0.019	5.90	0.041	10.30	11.51
1994-95	0.9406	0.9588	0.9487	5.74	8.11	8.72	-0.018	7.25	0.024	10.25	11.02
1995-96	0.9399	0.9568	0.9503	5.96	7.75	8.67	-0.017	7.34	0.022	9.55	10.68
1996-97	0.9433	0.9584	0.9529	5.18	8.41	9.34	-0.015	7.84	0.024	12.73	14.14
1997-98	0.8236	0.7051	0.7755	5.50	8.44	9.27	0.116	4.76	-0.132	7.31	8.03
1998-99	0.8273	0.6906	0.7852	5.22	7.93	8.98	0.137	6.57	-0.219	9.99	11.31
1999-00	0.2750	0.5616	0.5542	5.64	8.99	10.57	-0.287	6.37	0.584	10.15	11.94

B The Growth Case

The basic model due to Jones (1965), is given by the following equations:

Aln. N + Alt. T = L ...(B.1)

Akn.N + Akt. T = K ...(B.2)

which give the full employment condition for the two factors of production and,

Aln.w + Akn.r = PN ...(B.3)

AlT.w + A kt.r = PT ...(B.4)

which give the unit cost conditions for producing the two goods

Let, x*= dx/x

λij = share of factor i (K,L) in industry j (T,N)

by full employment condition λiT + λ iN =1 (i=K, L)

θ ij = factor share of i in industry j (θ IT =Alt.w/PT)

by zero profit condition, θlj + θ kj =1 (j= T,N)

Assume N is capital-intensive so λIT) λIN

As the rows in the matrices for the coefficients of the determinants of λ and θ sum to unity,

Detλ. = λlN – λ kN and det. θ = θ lN – θ lT

Defining the elasticity of substitution i as (i=N,T):

σ i = (aki*–ali*)/ (w*–r*)

Totally differentiating, B.1 to B.4, and using the above definitions and the profit maximising conditions:

θ li.ali* + θ ki .aki* = 0 ...(B.5),

yields:

λ jN. N* + λ jT. T* = j* + δ j (w*–r*) (j=L,K) ...(B.6)

θ li. w* + θ ki. R* = P*i (i=N,T) ...(B.7)

where

δ l = λ lN . θkN . σ N + λ lT . θ kT . σ T

δ k = λ kN . θlN . σ N + λ kT . θ lT . σ T

On the demand side we assume tastes are homothetic, hence consumption of N and T depends only on relative prices (PN/PT). Hence:

N/T = f(PN/PT),

Differentiation of which yields:

(N*–T*) = –σ d (PN* – PT*) (B.8)

where, σ d is the elasticity of substitution in consumption of the two goods.

From B.6 and B.7 we obtain:

(N*–T*) = (1/detλ.) (L*–K*) + σ s (PN*–PT*)

where σ s = (1/detλ. x detθ) (δ l + δ k)

that is the elasticity of substitution between the two commodities on the supply side.

The change in the commodity price ratio is given by the interaction of demand and supply:

(PN*–PT*) = (1/det λ (σ s + σd)) (L*–K*) ...(B.9)

and of the change in the ratio of the commodities produced:

(N*–T*) = (1/det λ)[σ d/(σ s+σd)] (L*–K*) ...(B.10)

Finally, we have the accounting relationship defining domestic output Y:

P.Y= PN.N + PT. T ...(B.11)

Totally differentiating B.11 and denoting by θ i the share of commodity i (N,T) in GDP, we have:

Y* = θ N (PN* + N*) + θ T (PT* + T*) ...(B.11a)

From B.9, B.10 and B.11, normalising, PT, PN, t and N at unity and with PT*=T* = 0, we can determine the growth rate Y* in term of non-traded goods as,

Y* = A[θ N/detλ] (L*–K*) ...(B.12)

Where A = [(1– σ d)/(σ s + σ d)]

We have used B.12 to determine the growth rate of output with capital inflows as derived in Appendix III, Table A-3. EPW

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Notes

1 This is a revised version of Lal-Bery-Pant (2003), which led to a number of responses from a variety of critics, not least from the Reserve Bank of India (2003). Also see Mulji (2003a,b), Rajwade (2003a,b), Joshi (2003). In Lal-Bery-Pant (2003a), we presented a reply to some of these critics. One of the major sources of these criticisms, we argued, was based on a misunderstanding of the basic accounting identities, which must hold in an open economy. Hence we spell these out in Appendix I, and deal with the other criticisms in the footnotes in this revised version of our paper.

2 The price increase reflects the elasticity of supply of non-traded goods over the relevant time horizon. In the initial period this supply elasticity will be low because of the assumption of full employment, generating quasi-rents, but over time this effect may diminish as resources are drawn into the non-tradeables sector. Over the medium term we may also expect the Balassa-Samuelson effect to be observed because of the differential growth in productivity between goods and services. Both deregulation policy and infrastructure policy can play a role in expanding the short-term elasticity of supply of non-tradeables, and thereby diminishing the real exchange rate appreciation associated with a demand shock such as a capital inflow.

3 The issue of whether capital flows should be absorbed depends primarily on whether they accrue to the private or the public sector. Assuming that private agents make their own risk assessments, if the flows accrue to the private sector, there should be no need to neutralise their actions. This

Appendix III Table A-3
Data Set for Alternative Growth Scenario

Year	GDP at Factor Cost	Net Domestic Capital Formation	Net Capital Stock	Capital Inflow	Crowding Out of Private Investment	I^ (Inclusive) of Capital Flows)	I^# (Inclusive of Crowding of Private Investment	I/Y	I^/Y	I^#/Y	K/Y	K*= dK/K	K*^= dK/K	K*^#= dK/K	L*	K*-L*	K*^-L*	K*^#-L*
1990-91	692871	126185	1918761	16607	4321	142792	147113	18.21	20.61	21.23	2.77	6.58	7.44	7.67	2.43	4.15	5.01	5.24
1991-92	701863	97782	1995190	18891	11742	116673	128415	13.93	16.62	18.30	2.84	4.90	5.85	6.44	2.43	2.47	3.42	4.01
1992-93	737792	109285	2077675	13007	13719	122292	136012	14.81	16.58	18.43	2.82	5.26	5.89	6.55	2.43	2.83	3.46	4.12
1993-94	781345	115059	2144285	46926	12847	161985	174832	14.73	20.73	22.38	2.74	5.37	7.55	8.15	2.43	2.94	5.12	5.72
1994-95	838031	153424	2283999	54162	13866	207586	221452	18.31	24.77	26.43	2.73	6.72	9.09	9.70	0.98	5.74	8.11	8.72
1995-96	899563	171394	2470063	44257	22657	215651	238308	19.05	23.97	26.49	2.75	6.94	8.73	9.65	0.98	5.96	7.75	8.67
1996-97	970083	161051	2615023	84471	24421	245522	269943	16.60	25.31	27.83	2.70	6.16	9.39	10.32	0.98	5.18	8.41	9.34
1997-98	1016266	178926	2762869	81301	22930	260227	283157	17.61	25.61	27.86	2.72	6.48	9.42	10.25	0.98	5.50	8.44	9.27
1998-99	1083047	176624	2882955	78276	30172	256900	287072	16.49	23.72	26.51	2.66	6.20	8.91	9.96	0.98	5.22	7.93	8.98
1999-00	1151991	199950	3022264	101233	47858	301183	349041	17.36	26.14	30.30	2.62	6.62	9.97	11.55	0.98	5.64	8.99	10.57

is the framework that applies in most industrial countries. Unfortunately in recent debt crises in emerging markets, the public sector has often been required or induced to take on private foreign debts as well. This creates both moral hazard and a potential externality. As this externality is typically associated with debt finance, there is a case for limiting commercial bank borrowing in foreign currency. Problems of excessive borrowing are more likely to arise with flows directed to the public sector, which are less disciplined by inter-temporal budget constraints, but these are not at issue in the present situation. The aggregate measure of sustainability of capital flows is the external debt to GDP ratio, and other associated external debt ratios, which currently are at sustainable levels in India.

4 The relative shift in the outputs of traded and non-traded goods will be determined by the relative factor intensities of the two goods. We have assumed in the diagram that non-traded goods are more capital-intensive than traded goods. This corresponds with the empirical estimates we have made of the factor intensities of these two composite commodities for India given below. As is well known, the Rybczynski line (not drawn) for an expansion of the capital stock relative to labour supply, which shows the points on the new PPF with the same commodity price ratio (er) will lie below the horizontal line drawn from A. Hence at the same er on the new PPF, the output of N will expand absolutely and relatively to that of T [Bhagwati and Srinivasan 1983: 64-66]. This gives the N-biased shift in the PPF's with capital accumulation shown in the diagram.

5 The loss of reserves in response to the fiscal deficit only comes if the deficit is fully monetised. This is not the case in India, and we have a large fiscal deficit and rising reserves [Lal, Bhide and Vasudevan 2001].

6 Capital inflows used in the calculation are net capital inflows. It is further assumed that the absorption of these will lead to a sufficient increase in future income to allow them to be serviced.

7 In this context it is worth noting that this paper does not as RBI (2003, p VII-42) assert "base its conclusions on the [estimated] relationship between the real exchange rate, capital inflows, excess demand and the growth rate". The essential basis for our contention that, the growth rate in the Indian economy would have been higher had capital inflows been absorbed by the economy and been invested instead of being accumulated as foreign exchange reserves is based on basic accounting identities which must hold in an open economy. The following empirical estimates of the growth foregone do not depend upon this estimated relationship for the real exchange rate.

8 This Appendix is available at www.ncaer.org and its notes describe how the classification into traded and non-traded goods are made.

9 Conceptually ED_t should have been calculated by taking into consideration non-factor services along with trade of goods. However, our estimates of er are based on goods from WPI data and services are not considered in the estimation. Hence ED_t is estimated by taking into account goods only.

10 This is correctly noted by RBI (2003), Box VII 8. But, they do not mention that the alternative estimates made by assuming plausible elasticities for the static model of Appendix II (A) also leads to very similar estimates for the real exchange rate if the capital inflows were fully absorbed. Also, as the RBI (2003) rightly notes the estimates of foregone growth due to non-absorption of capital inflows derived below do not depend upon these estimates of the likely real exchange rate appreciation with the absorption of capital inflows.

11 These are clearly limiting assumptions, for in practice any increased expenditure allowed by the capital inflow will allow some increased consumption and government expenditure apart from an increase in investment. This is an old controversy from the 1960s and 1970s when it was debated whether foreign aid inflows were invested or consumed. The correct answer of course is that, if both present and future consumption are normal goods, both consumption and investment will increase [Lal 1972]. Hence, it is incontrovertible that investment will go up, but by an amount we had no means of estimating. If one believes that, the whole of the inflow if absorbed would have been consumed, then clearly there would have been no effect on growth. But, as per capita consumption in each period would then have been higher, welfare would still have been higher than if the inflow had not been absorbed. Similarly we did not estimate the actual extent of sterilisation of the inflows. Joshi (2003) assumes that the actual rise in reserves represents the extent of sterilisation. But as can be seen from eqtn (2a) in Appendix I, the rise in reserves is the net effect of both sterilisation and domestic monetary and fiscal policy. Thus suppose that there are no capital inflows and hence no rise in high powered money (H) in (2a) but, there is a domestic credit contraction (DC falls), this will lead to a rise in reserves (NFA). Joshi, therefore asks a different question from the one being posed in this paper. He asks by how much would growth have been higher if the incremental reserves in each year had been invested to raise the domestic capital stock? This gives a lower potential incremental investment rate than ours, and hence lower forgone growth rates.

12 Both RBI (2003) and Joshi (2003) prefer to use a crude Harrod-Domar model based on incremental capital-output ratios (ICOR's) to estimate foregone growth. But, whereas Joshi uses the ICORs derived from the actual growth rates (in our table 3) and investment rate (I/Y in Table A-3), the RBI uses an ICOR of 4, to claim that additional growth of only "about 0.5 per cent could have been achieved". (Box VII 8, p VII-43). But as has been well known for over 40 years, the Harrod-Domar model and in particular the uses of ICORs have serious weaknesses (see the Appendix by Streeten in Myrdal (1968)). At least our two factor-two sector open economy growth model is intellectually more respectable. Lacking the requisite elasticity estimates, we have used the implicit value of the parameter A from the actual growth process in each year to make the projections. This implicit value captures whatever changes have occurred at the microeconomic level in each year in the growth process. By applying its changing derived value to the incremental investment made possible by absorption of capital inflows in each year, we are merely assuming that the same growth process would apply to that yielding the actual growth rate.

13 Both RBI (2003) and Joshi (2003) seem to accept that sterilisation of capital inflows has led to foregone growth, though their estimated losses are lower than ours for the reasons given in notes 10 and 11. Given this, many of the statements in RBI (2003) are puzzling. It states "high reserves reflect the lack of absorption/demand" (para 7.119). But, from our Appendix I, identity (9), it is clear that it is only if the capital inflow (K + R) is offset by an equivalent change in DNFA (i e, it is sterilised) will domestic absorption (E) not increase relative to output (Y). The statement following this: "prescribing real appreciation as a means to raise domestic absorption completely disregards the importance of the trade-off between growth and stability and the role of a central bank in ensuring stability as a means to higher growth", is equally puzzling. It is not clear what 'stability' is being referred to. Is it the stability of the growth rate, of prices, of money supply, the nominal exchange rate, the real exchange rate or what? If the reference is to what in open economy macroeconomics is called maintaining internal balance along with external balance, then as Figure 1 shows there is no reason why both cannot be maintained while absorbing the capital inflows. If it is price stability that is the stability being referred to, then as noted in the text above, allowing the absorption to occur through a nominal exchange rate appreciation will not lead to inflation, indeed just the opposite. If the concern is the stability of the growth rate, it is part of an old debate concerning the effects of the instability of income on the growth rate. Both theory and evidence point to this concern being misplaced [Lal and Myint 1996]. To give just one illustration, in the post second world war period Hong Kong has had one of the highest average but most volatile growth rates. India by contrast has had a stable but low growth rate. Whose economic performance is preferable – India's stability of death or Hong Kong's instability of exuberance?

More recently Ranciere-Tornell-Westerman (2003) have looked at the empirical evidence concerning crises and growth and find "a robust empirical link between higher growth and a propensity for crisis" (p 2). To explain this link they provide a two sector long run growth model with a traded and non-traded good sector, in which financial crises can occur, but are low probability events. The non-traded sector is financially constrained because of contract enforceability problems, while the traded goods sector is unconstrained as it has access to world capital markets. The currency mismatch of the foreign currency debt of the non-traded good sector leads to financial fragility. As non-traded goods are required as inputs into traded good production, traded good producers are willing to pay an implicit tax to provide bail out guarantees that insure lenders only against systemic risks. In the model this leads to higher growth as it allows the non-traded sector to break its financial constraint, even though this implies risky borrowing. The authors explicitly consider the safe stable credit path followed by India and the more risky unstable path followed by Thailand. As they remark "Thailand has experienced lending booms and crises, while India has pursued a safe growth path for credit. GDP per capita grew by only 99 per cent between 1980-2001 in India, whereas Thailand's GDP per capita grew by 148 per cent, despite having experienced a major crisis" (p 3).

14 The RBI (2003) statement that "growth gained through full absorption could be offset by lower growth resulting from displacement of domestic producers" (para 7.121) also makes no sense in a general equilibrium system as laid out in the accounting identities in Appendix I, and Figure 1. Of, course tradeable goods producers would see their output decline relative to non-traded goods producers, but there is no reason why total output and growth should decline. While regarding the RBI's claim that "foreign capital should not be allowed either to give rise to excessive consumption or excessive investment just to ensure full absorption" (para 7.123), what is 'excessive' consumption or investment? We are unable to make any analytical sense of this statement. Real exchange rate estimates tell us by how much the nominal exchange rate would have had to be appreciated or non traded goods prices (inflation) to rise for the full absorption of the capital inflows.

15 Where there is a genuine windfall, part of the extra expenditure this 'gift' allows will immediately be spent on tradeables, generating a trade deficit. Furthermore, the part spent on non-tradeables will raise the relative price of non-tradeables (i e, the real exchange rate). This will induce a further switch in consumption away from non-tradeables to tradeables, till the 'gift' is fully absorbed and the trade deficit equals the 'gift'.

16 Rajwade (2003) argues that an appreciating currency would "lead to lower if not negative inflation in the non-tradeable sector, making investments less attractive". While an appreciation of the nominal exchange rate would undoubtedly lead to a fall in traded goods prices, there is no reason why non-traded goods prices should fall. Moreover, there is no reason why investments in the non-traded goods sector should be less attractive. Instead because of the real exchange rate appreciation, the relative price of non-traded goods and hence their relative profitability and attractiveness to investors should rise.

17 This in effect is what RBI (2003), Joshi (2003) and Rajwade (2003) are commending.

18 RBI (2003) argues that the emerging market crises "shows that with low reserves and appreciated real exchange rate, India would have also faced a similar (or even more sever) crisis" (para 7.120). This reading of the emerging market crises ignores what is now generally recognised as the major reason for the crises – the quasi fixed nominal exchange rate. The real exchange rate appreciation was inevitable given the large capital inflows. But as these were subject to substantial moral hazard as the foreign banks assumed that there were implicit exchange rate guarantees underwritten by the local government and the IMF, there was over-lending which turned sour. There is no reason for this to happen, particularly if, as we recommend, borrowing by domestic residents in foreign currency is controlled, or compulsorily hedged against foreign exchange risk. This implies greater freedom for introducing hedging instruments and derivatives than the RBI has traditionally been comfortable with.

19 Rajwade (2003) is right to argue that foreign direct investment brings not only capital, but also better technology which further raises the growth rate.

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