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EXCHANGE RATE REGIMES OF LESS DEVELOPED COUNTRIES: THE CASE OF INDIA

by

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DEDICATION

In loving memory of my father

CONTENTS

PART III: EXCHANGE RATE INSTABILITY AND TRADE FLOWS

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ABSTRACT

Although there exists a large volume of literature on the theory and practice of LDC exchange rate regimes in the post-Bretton Woods era, it is mostly of a general nature treating LDCs as a whole. There are very few studies which examine in depth the special features of individual exchange rate regimes. Moreover, the issue of exchange rate instability that characterized the generalized floating of world's major currencies since the early 1970s, has so far received only superficial treatment as far as LDCs are concerned. The thesis attempts to fill these gaps by examining the Indian case in detail.

An exchange rate policy in fact has two aspects. First, it involves the establishment of an optimal exchange rate regime which lays the framework for the day-to-day determination of the nominal exchange rate. Second, the exchange rate policy is concerned with the operation of the exchange rate regime in such a way as to promote given policy objectives. In the context of generalized floating, the decision regarding exchange rate regime for an LDC has to be made on the grounds of "internal balance", i.e., with a view to protecting the domestic economy from disturbances arising from day-to-day third currency fluctuations. This would require a multi-currency peg based on balance of trade elasticities. Once an exchange rate regime is established, it has to be managed on considerations of "external balance". This in turn would require adjustments in the value of the peg, either to compensate for the

inflation differential between the home country and its trading partners, or in order to bring about a balance of payments adjustment.

India adopted a basket peg since September 1975. However, India's basket system does not appear to be optimal, firstly because of the major role given in it to sterling as the currency of intervention, designation and valuation, and more importantly, because the official currency basket does not seem to be representative enough and also is not based on elasticity weights. Concerning the management of the basket peg, it appears that the authorities have been guided by a number of alternative considerations which came into conflict with the objective of external balance. Particularly, considerations such as the minimization of speculation and inflation, and the stabilization of the rupee-dollar rate seemed to have considerably influenced India's exchange rate policy. An important result of the promotion of the above alternative objectives has been high exchange rate volatility.

Exchange rate instability depresses trade by generating exchange risk. In the context of LDCs with quantitative restrictions on private imports and direct government imports, the impact of exchange risk is felt much more on exports than imports. Previous studies on the impact of exchange rate instability on LDC exports have suffered from specification mistakes of export functions as well as inaccuracy of the exchange risk proxies employed.

We developed a fully specified exchange risk-augmented demand-supply model of exports for India. We used this model to estimate the impact of changes in exchange rate and exchange risk on exports in the aggregate as well as for the two disaggregated groups, namely, manufactured and non-fuel primary products. The separate effects on the volume and price of exports were estimated. We also demonstrated that the signs of the exchange risk elasticity coefficients in export price equations are consistent with the invoicing pattern of India's exports.

We simulated the results of the export model under reasonable assumptions for the medium term, and demonstrated the possibility of much gains on current account through a policy of reducing exchange rate instability in real terms. They also tend to show that an equilibrium exchange rate cannot be defined independent of the short-term fluctuations of the exchange rate. The results of the study have profound implications also for other LDCs which are subject to chronic balance payment deficits.

LIST OF TABLES

Appendix Tables

LIST OF FIGURES

Chapter 1

Introduction

The breakdown of the Bretton Woods par value system and the subsequent floating of major currencies in the early 1970s, offered a spectrum of options to world's less developed countries (LDCs) with regard to the choice of an exchange rate regime. There have been a number of theoretical and empirical studies on the theme of the post-Bretton Woods LDC exchange rate policy, but they were mostly of a general nature and there exists very few in-depth studies on any specific LDC case. The existing studies,although could bring out some common features of LDC experiences, have generally lost sight of the more unique features of each LDC experience the understanding of which entails a much deeper and more concentrated study. In this thesis, we attempt to fill the gap by concentrating on the Indian case. We critically examine the Indian exchange rate policy with respect to the adoption of an exchange rate regime after the demise of the Bretton Woods adjustable peg regime and its operation ever since.

India is not a typical less developed country (LDC) due to a number of reasons. Firstly, the country has a balanced economy in the sense that the primary, secondary, and services sectors contribute almost an equal one-third to the national income. Secondly, India has a relatively closed economy with the total of exports and imports constituting only less than 15 per cent of the GDP. Thirdly, the country has a fairly diversified industrial base and the manufacturing products constitute over two-thirds of her total exports. Yet another notable feature of the Indian economy is that it is now food self-sufficient, and the country could manage even the worst harvest failure without any foodgrains imports.

While the above characteristics distinguish India from a typical LDC, she is still a low-income country with over one-third of the population lying below the officially defined poverty line. As regards the financial system, although the country has a reasonably developed banking sector with extensive rural network, it is mostly government-owned and the deposit and lending rates are centrally administered. On the external sector, the country retains one of the most rigid trade and exchange control regimes[1] which makes the domestic currency inconvertible both on the current and capital accounts. This is particularly due to the fact that the country has been running balance of payments deficits ever since the mid-fifties, ignoring the brief period of 1975-79. It is this persistent balance of payments problem which makes the study of India's exchange rate policy particularly interesting.

The thesis is divided into four main parts. Part I examines the theory and practice of LDC exchange rate regimes. The different exchange rate practices adopted by LDCs since the collapse of the Bretton Woods system are described in Chapter 2. In Chapter 3, these practices are critically examined through a synthesis of the massive literature on LDC exchange rate regimes which emerged since the middle of 1970s.

Part II discusses the Indian exchange rate regime. The theory could only partly explain the actual LDC exchange rate systems as the latter are also influenced by institutional factors. This is particularly true of the Indian exchange rate regime with an institutional framework produced by the long history of the dominant-dependent relationship between Britain and India. In Chapter 4, we examine the Indian exchange rate system in historical perspective as it evolved from a silver standard of the early 19th century to a flexible multi-currency peg of the present time. The present Indian exchange rate regime, while bearing the mark of the long historical association between Britain and India, also exhibits many new additional interesting characteristics. In Chapter 5, we take a close look at the mechanics and salient features of the Indian exchange rate system, which is broadly termed as a basket peg.

A particular problem associated with the generalized floating of world's major currencies has been the rise in short-term exchange rate instability. Exchange rate volatility introduces yet another element of uncertainty into the decision-making process of international trading firms. In developed countries which generally follow a market-determined exchange rate system[2], the exchange rate instability is largely endogenous and, to some extent, that compensates for the instability in other parts of the economy. In LDCs which generally follow a pegged regime, the resulting exchange rate instability is largely exogenous and could have detrimental effects particularly on their exports. The limited availability of forward market facilities in foreign exchange, and the system of foreign-currency export invoicing, are other factors aggravating the adverse impact of volatility in exchange rates on LDC exports. While the empirical work on the impact of short-term exchange rate instability on developed countries has been proliferating, unfortunately, despite the greater seriousness of the problem in LDCs, there have been only a few LDC studies in this regard. Moreover, the existing studies on specific LDCs suffer from a number of difficulties relating to the specification of export functions and the accuracy of exchange risk proxies. Part III of the thesis addresses this problem from the angle LDCs as a whole and for India in particular, through Chapters 6 to 9.

Chapter 6 develops the concept of exchange risk arising from short-term exchange rate fluctuations as a cost on both the supply and demand sides of trade, and also examines critically the commonly employed measures of exchange risk. Chapter 7 constructs alternative exchange risk measures relevant to India and, with the help of these measures, examines the Indian basket peg for its contribution towards moderating exchange risk. Chapter 8 surveys the major empirical studies of the impact of exchange risk on trade flows, separately for developed and developing countries. Chapter 9 develops an export model for India, and empirically estimates the impact of exchange rate and exchange rate risk on India's exports for the period 1968-86.

Chapter 9 constitutes the major empirical work of the thesis. It employs a fully specified exchange risk-augmented demand-supply model for India's exports, and uses it to estimate India's exports in the aggregate and separately for the manufactured and non-fuel primary products. This is in contrast to the existing studies which have assumed away either the supply side or the demand side of the export market. Moreover, the present study distinguishes between the price and volume effects of both exchange rate and exchange risk. It also brings out the role of currency invoicing of India's exports in explaining the signs of the price elasticities of exchange risk. Finally, this chapter also estimates the domestic price effect of a nominal depreciation of the rupee.

The analyses of India's exchange rate regime, its operation since the introduction of the basket peg, and the empirical study of the impact of exchange rate and its instability on India's exports have important implications for policy. We examine the main policy implications of our study in Part IV of the thesis, which also makes up Chapter 10 of the thesis.

Chapter 11 sets out a summary of the major conclusions of the thesis.

Footnotes

1. Although the rigours of controls are being reduced in India with the introduction of a number of liberalization measures since 1985, the process is slow and the basic framework of controls remains essentially the same so far.
2. It may, however, be noted that the exchange rates of developed countries are not fully market-determined as there are different degrees of central bank intervention in these countries. Nevertheless, those exchange rates are much more freely determined than those of most LDCs.

Chapter 2

LDC Experience of Exchange Rate Regimes

2.1 Introduction

The choice of exchange rate regime is an important issue for any country. The Bretton Woods agreement at the close of World War II provided for a uniform 'adjustable peg' exchange rate regime for all member countries. As the Bretton Woods system broke down in the early 1970s, developed countries generally adopted a flexible exchange rate regime.[1] With the advent of the generalized floating of major currencies, LDCs were faced with a number of choices ranging from pegging to a single major currency to independent floating. We examine in this chapter how LDCs have tackled the issue of the choice of exchange rate regime after the collapse of the Bretton Woods adjustable peg system.

2.2 Classification of Exchange Rate Regimes

We follow the IMF classification of exchange rate regimes into three broad groups, namely, (1) pegged to a single currency; (2) pegged to currency composite; and (3) flexible arrangements. The first category is further subdivided by the IMF into three sub-categories, namely, (a) pegged to U.S. dollar, (b) pegged to French franc, and (c) pegged to other currency.. The second category is the basket peg which is sub-categorized into SDR peg and self-chosen basket peg, the latter also called sometimes 'own-currency basket peg' or 'tailor-made basket peg'. With regard to the third category of flexible exchange rate regimes, the IMF introduced a four-fold subcategorization since 1982. They are (a) adjusted according to a set of indicators which is usually called 'the crawling peg'; (b) limited flexibility against U.S. dollar; (c) other managed floating; and (d) independent floating. There is need to extend that classification backwards in order to get a better idea of the trends in the LDC exchange rate regimes. We constructed a table (Table 2.1) which gives a synoptic view of the evolution of the exchange rate regimes of LDCs from 1973 to 1988. The review in this chapter closely follows this table.

2.3 The Immediate Post-Bretton Woods Developments

The initial reaction of LDCs to the generalized floating of the world's major currencies has been to tie their currencies to one of the major currencies. Thus, as seen in Table 2.1, during March-July 1973, 86 out of 97 LDCs (i.e., 89 per cent) pegged their currencies to one of the major currencies. This parallels the experience of the 1930s when the international gold standard broke down and the world got divided into several currency blocs. In the early 1970s, however, truly reflecting the much diminished role of the pound sterling and the enlarged role of the U.S. dollar, only 11 countries of the 32 overseas sterling area countries linked their currencies with sterling whereas 58 countries adopted the dollar peg. For some of the countries which instituted a sterling peg (e.g., Barbados, the Gambia, Guyana, Malawi, Mauritius and Sierra Leone), the U.K. still was the largest trade partner, accounting for 20 to 45 per cent of their trade (Osunsade, 1976a, p. 38). For others in this group, such as India and Sri Lanka, the sterling peg with the steady depreciation of sterling, brought about depreciation against their major trading partners and

Table 2.1 Evolution of LDC Exchange Rate Regimes, 1973-88 (Number of Countries)

Exchange Rate Regime	March-July 1973	June 1975	June 1980	June 1985	March 1988
1. Pegged to a single currency (a+b+c)	86	71	58	49	58
a) U.S. dollar	58	49	40	31	39
b) French franc	16	13	14	14	14
c) Other currency	12	9	4	4	5
Of which:					
Pound Sterling	11	8	1	1	-
2. Pegged to currency composite (a + b)	3	17	32	40	32
a) SDR	-	7	15	12	7
b) Other composite	3	10	17	28	25
3. Flexible arrangements (a+b+c+d)	8	10	28	38	40
a) Adjusted according to a set of indicators	6	6	3	6	5
b) Limited flexibility, vis-a-vis US dollar	-	-	8	6	4
c) Other managed floating	-	-	20	18	20
d) Independent floating	2	4	5	8	11
Total	97[a]	98	118	127	130

a. Excludes Guinea which was pegged to gold.

Source: Constructed from:
(1) IMF Survey, 2 February, 1976, pp. 35-39
(2) IMF Annual Report of the Executive Board, various issues
(3) IMF Annual Report on Exchange Arrangements and Exchange Restrictions, various issues.

competitors.[2] Of 16 countries which followed a fixed link with the French franc during March-July 1973, all except Algeria, Mauritania, Madagascar, Mali[3] and Tunisia belonged to the historical French franc area with a common currency called the CFA franc which the French treasury guarantees convertibility into French franc at a fixed rate of 50 CFA francs = 1 French franc.[4]

During March-July 1973, three countries (Malta, Morocco and Cyprus) pegged their currencies to a basket of currencies, a relatively unknown practice at that time. Of the eight countries which followed a flexible exchange rate regime, six (Brazil, Cambodia, Chile, Colombia, Uruguay and Vietnam) adjusted their exchange rates (against the U.S. dollar) frequently and in small steps according to certain objective criteria, i.e. the 'crawling peg' which antedates the collapse of the Bretton Woods adjustable peg. Only two LDCs (Lebanon and Philippines) were on independent floating during March-July 1973 but, as in the case of the crawling peg countries, their practice too preceded the generalized floating of major currencies and, therefore, cannot be considered a reaction to that.

Another practice which appears to have arisen from the inadequate knowledge of the working of the exchange markets in a generalized floating system is the 'cross pegging'.[5] This is not reflected in Table 2.1. We have at least two cases (Nepal and Guinea) where the authorities, in spite of the breakdown of the fixed exchange rate regime among major currencies, wanted to maintain a fixed relationship with more than one currency (see Osunsade, 1976b, p. 70). Nepal though was officially pegged to the U.S. dollar, maintained a fixed parity with the Indian rupee (which at that time was linked to sterling) because of the traditional economic and financial ties between the two countries. Similarly, Guinea maintained a fixed link with the U.S. dollar and certain European currencies based on their gold value during the period, March 1973-May 1975, which with the collapse of the par value system implied broken cross rates.

2.4 Subsequent Developments up to 1985

The subsequent developments in the exchange rate arrangements of LDCs up to 1985 indicated a general move away from single currency pegs to basket pegs including the peg to the SDR and also to more flexible arrangements, particularly what is termed as 'other managed floating' and, to a lesser extent, to independent floating. Thus, the number of LDCs pegged to a single currency decreased from 86 during March-July 1973 to 49 in June 1985, which represents a decline by more than half in percentage terms, i.e., from 89 per cent of all LDCs in March-July 1973 to 39 per cent in June 1985. In contrast, countries pegged to currency baskets grew from just three during March-July 1973 to 40 in June 1985 and those practicing flexible arrangements grew from eight in the earlier period to 38 in June 1985. Thus by June 1985, the basket pegging together with the flexible exchange rate regimes were practiced by about 61 per cent of LDCs.

The evolution within each major group is noteworthy. Within the category of single-currency pegging, we note a decline by nearly half in the number of nations practicing the dollar peg, i.e., from 58 during March-July 1973 to 31 in June 1985 and a drastic reduction in countries belonging to the sterling peg from eight to one over the same period and a more or less stable number of countries following a fixed relationship with the French franc. While countries outside the CFA franc system (i.e., Algeria, Tunisia, Mauritania and Madagascar) dropped the peg with the French franc, there have been newcomers to accept the fixed relationship with the French franc, namely, Comoros, Equitorial Guinea and Mali.[6]

Within the group of basket peggers, the number of countries adopting own-currency baskets grew from 3 during March-July 1973 to 28 in June 1985. This growth has been much larger than that of countries following the SDR peg which rose from nil to 12 in the same period with a fall from 15 to 12 from June 1980 to June 1985. This relative unattractiveness of the SDR peg needs to be explained in the light of the academic advice in favour of it. This will be taken up later.

Another interesting development has been the increasing trend toward managed floating and independent floating among LDCs. By June 1985, 18 countries (a fall from 20 in June 1980) were following some kind of administratively managed floating and eight countries somewhat unrestricted floating. Floating by LDCs is a new development which is rather surprising in the light of the academic literature which is examined in the next chapter. Before making further comments on this development we need to follow the more recent trends in LDC exchange rate regimes which are examined below.

2.5 Post-1985 Developments

Table 2.1 also allows us to view the very recent developments in the exchange rate regimes of LDCs. Firstly, we find a new favour for the dollar peg since 1985 with the number of countries with such an arrangement increasing from 31 in June 1985 to 39 in March 1988. Note also that presently no country maintains a sterling peg[7] and the number of countries with a fixed link with the French franc remained at 14 since 1980. In March 1988 LDCs with single currency pegs constituted 45 per cent of total, a rise from 39 per cent in June 1985. Secondly, there is a movement away from the basket peg with a decline in LDCs following such an exchange rate regime from 40 in June 1985 to 32 in March 1988. Note here that the switch is much more evident from the SDR peg with a large drop in the number of countries following such a system from 12 to 7 in the last three years whereas the number of countries following 'tailor-made' basket pegs declined only marginally, i.e., from 28 in June 1985 to 25 in March 1988. Thirdly, there has been a rise in interest for floating both of the managed and the unrestricted type, the former rising from 18 to 20 and the latter from 8 to 11 during June 1985-March 1988. Finally, there are currently four countries, namely,. Bahrain, Qatar, Saudi Arabia and United Arab Emirates, all belonging to the Middle East, which among the LDCs adopting flexible exchange rate arrangements, permit only limited flexibility against the U.S. dollar. Note that these countries are officially SDR peggers with $\pm$ 7.25 margins but in practice do not follow these margins strictly in order to maintain a stable relationship with the U.S. dollar. We shall make comments on each of these developments in the paragraphs below.

2.5.1 Erratic Shifts in Exchange Rate Arrangements

We may explain the recent recovery of interest in dollar pegging as the effect of the end of the long period appreciation of the U.S. dollar and its subsequent depreciation against other currencies since March 1985. When the dollar had been appreciating over the previous five years, countries could maintain the fixed dollar peg only at the cost of severe appreciation of their effective exchange rate which could be detrimental to their external balance. Hence a number of countries depegged from the dollar during 1980-85. We may then ask, why several LDCs shifted out of the dollar peg during 1975-80 when dollar showed a trend depreciation? (See Table 2.1). In fact, there had been no significant move away from the dollar peg during 1975-80 when we take into account the number of countries which kept limited flexibility vis-a-vis dollar during that period as indicated in row 3 (b) of Table 2.1. After the initial shift away from dollar pegs to mainly basket pegs during 1973-75, the massive departure from the dollar peg took place only during the period of dollar appreciation, i.e., during 1980-85. After 1985, the turn-around in the value of the dollar along with the continued pre-eminent position of the dollar as a vehicle currency and invoicing currency attracted a number of countries back to dollar pegging. The additional dollar peggers since 1985 include some earlier SDR peggers (Sierra Leone[8] and Vietnam), own-currency basket peggers (Guyana and Mozambique), managed floaters (Ecuador and El Salvador) as well as short time free floaters (Uganda and Zambia)[9].

We note in the above instances how the choice of exchange rate regime is influenced by the cyclical behaviour of the U.S. dollar. Apart from these cases which pertain to very recent experience, we could also find a number of other cases where the authorities changed from one exchange rate regime to another with shifts in the value of the dollar. Take the example of the Middle Eastern countries of Bahrain, Qatar, Saudi Arabia and United Arab Emirates which we briefly mentioned earlier. These countries are mainly oil producers and their exports are priced in U.S. dollars whereas their imports are diversified and priced mostly in non-dollar currencies. They initially shifted from the dollar peg to the SDR peg which was prompted by the depreciation of the dollar which had an inflationary effect on their economies through the import prices. However, later when the dollar appreciated, these countries in practice kept a stable relation with the dollar and thereby became de facto dollar peggers again.[10]

Malawi is yet another example where the exchange rate regime had to undergo erratic shifts in early 1970s which was predicated by the use of exchange rate regime for the domestic price objective. (Osunsade, op.cit. p. 70). The country was initially on a sterling peg. The large and steady depreciation of sterling made the authorities to switch to a basket consisting of just two currencies, namely, sterling and the dollar, in November 1973. For some time this helped in the stabilization of domestic price as the exchange rates of sterling and the dollar generally moved in opposite directions. Later, however, both the currencies began to depreciate, thereby worsening the domestic inflation. This prompted the Malawian authorities to move to the SDR peg.

2.5.2 SDR Pegs Out of Favour?

We noted earlier that although basket pegs became increasingly popular up to 1985, there has been a decling interest in such a system, particularly the SDR peg, thereafter. Looking more closely we understand that, while there has been a number of switches from own-currency baskets to more flexible arrangements after 1985 (China, Madagascar, Maldives, Mauritania, Singapore and Tunisia), the shifts from SDR pegs have been towards own-currency basket pegs (Kenya, Sao Tome & Principe and Vanuatu) and dollar pegs (Sierra Leone and Vietnam). As a result, whereas the 'tailor-made' baskets reduced their importance only marginally with 25 countries still holding on to such a system in March 1988, the SDR pegs dropped to just 7 by March 1988 from 15 in June 1980 and 12 in June 1985.

There has been a number of studies showing that the SDR basket would broadly stabilize the effective exchange rate of majority of LDCs and is, therefore, superior to single currency pegs with the exception of some Caribbean countries for which the dollar peg is superior and the Francophone African countries for which the existing tie with the French franc is superior. (See e.g., Crockett and Nsouli, 1977; Helleiner, 1981; Williamson, 1981a; and Brodsky and Sampson, 1984). Further, a uniform SDR peg by several nations has the advantage of stabilizing the cross rates between the currencies of these nations which, in turn, would encourage intra-LDC trade. Lastly, since the SDR itself is a basket of major currencies with weights roughly reflecting their importance in world trade, they could be particularly relevant for countries exporting homogeneous primary commodities the world prices of which are determined by the distribution of world imports rather than the direction of trade of the country's own exports.[11] (See Williamson, 1982, pp. 55-59).

In spite of the above merits of the SDR peg, it appears that such an exchange rate system is on the wane. As noted by Black (1976) and Crockett and Nsouli (1977), the SDR peg has the drawback common to any basket peg of not being able to use the peg-unit as the intervention medium. That is, the SDR being not a medium of exchange but a unit of account cannot be used by authorities for the purpose of intervention in exchange markets. Williamson

(1982, p. 59) did point out that unless the SDR becomes attractive as an intervention and vehicle currency, the balance of advantages of the SDR over an own-currency basket would not look convincing for countries to make a widespread spontaneous move toward SDR pegging.

2.5.3 Switch to More Flexible Exchange Rate Regimes

Among the different types of LDC flexible exchange rate arrangements, it is interesting to compare the sub-category, 'adjusted according to a set of indicators' with the 'other managed floating'. Williamson (1981b) distinguishes between two types of crawling pegs: the 'rule-based crawling peg' and the 'decision-variant crawling peg'. It is the former that is represented by our sub-category 'adjusted according to a set of indicators'. It is further felt appropriate to designate the 'other managed floating' as the 'decision-variant crawling peg' or the 'discretionary crawling peg'. This is explained below.

A number of countries in the category of 'other managed floating' generally follow a basket peg which is made to crawl on the basis of several unannounced considerations. For example, China followed a basket peg up to 1985 and in January 1986, shifted to a system whereby the exchange rate is adjusted presumably according to developments in balance of payments and also costs and exchange rates of major competitors. Guinea-Bissau although operating a SDR basket, adjusts exchange rates based on domestic price movements. India also has a discretionary crawling basket peg.[12] South Korea too manages a crawling basket peg with the basket based on a combination of trade weights and SDR weights. Other examples of the discretionary crawling basket peg are Mauritania which followed a publicly announced own-currency basket peg till recently, Morocco and Tunisia.[13] The remaining countries in the 'other managed floating' category do not operate any basket system but alter their exchange rates vis-a-vis the U.S. dollar, the intervention currency, based on a number of considerations gradually and in frequent intervals. Some examples are Argentina, Costa Rica, Mexico, Sri Lanka and Yugoslavia.

Another interesting development has been the recent adoption of free floating by a number of LDCs. The number of LDCs which allowed market-determination of exchange rates moved up from 5 in June 1980 to 8 in June 1985 and were as high as 14 in March 1987 before declining to 11 in March 1988. The IMF have recently conducted a study of the LDC experience of floating (see Quirk et al., 1987).

Among the LDCs which adopted floating, most did so as the only feasible solution to the severe protracted balances of payments difficulties and as a part of the Fund-supported adjustment programmes.[14] A major reason advanced for the decision to float in these countries is that the other alternative of large discrete adjustment of exchange rate was considered politically intolerable. It was also thought in some of these countries that floating exchange rates would bring into the fold of the official sector the large illegal or unofficial parallel markets in which exchange rates have heavily depreciated.

The floating exchange rate system adopted in these countries took two different forms. The first is similar to the type that is invariably prevalent in developed countries with floating exchange rates, i.e. the one which operates through the private inter-bank system. Such an arrangement was opted for in countries such as Dominican Republic, the Gambia, Lebanon, the Philippines, Sierra Leone, South Africa, Uruguay and Zaire. In those countries without sufficient financial infrastructure, the authorities chose a second form, namely, an auction system in which the central bank itself organizes the market and which necessarily involves the surrender of foreign exchange receipts to the central bank. The countries that have been conducting the auction process are Bolivia, Ghana, Guinea, Jamaica, Uganda and Zambia. Nigeria introduced a composite of both forms, i.e., an auction system for allocation of foreign exchange receipts from oil to an interbank market.

It is too early to pronounce a judgement on the floating experience of LDCs. However, the development is significant as it challenges the conventional wisdom that floating is infeasible in most LDCs due to the absence in these countries of mature financial markets and their lack of integration with foreign markets and also because of the highly open nature of these countries.[15] But it is also significant that a few countries which gave up the experiment, namely, Jamaica, Uganda and Zambia, belonged to the category with relatively underdeveloped financial infrastructure and which adopted an auction system rather than the inter-bank markets for the determination of exchange rate.

The IMF study cited earlier indicates that the floating rate system recently adopted in LDCs did not lead to a free fall of the exchange rate thereby leading to a spiralling of inflation in these countries. Moreover, the exchange rate instability during the floating period has been generally less than that in the immediate pre-float period. Three major factors are reported in this connection: first, there has been central bank intervention to stabilize the rates; second, the reduced instability of the underlying economic conditions, particularly in primary commodity prices; and third, the possible absence of destabilizing speculation activities normally found in an 'adjustable peg' system.

We need to stress that the recent adoption of floating in LDCs had been rather controlled experiments which might not fully qualify as free floating. In those countries which allowed interbank markets thereby creating an atmosphere favourable to free floating, limits were put on the foreign exchange positions of commercial banks and other dealers admittedly to avoid monopoly situations. In countries which adopted the auction system, the authorities kept a high controlling position through the exchange surrendering procedure and the setting aside of a large portion of foreign exchange for extra-market allocation on government account. The relatively stable behaviour of exchange rates reported during the floating period must have been aided greatly by the 'bridging' finance many countries obtained from official and commercial bank sources and also due to the financial support from the Fund. Above all, it should be noted that whereas the countries which introduced floating although undertook liberalization on current account transactions, there still remained current account restrictions, particularly import licensing, in most of these countries and more importantly, most of these countries did not undertake any liberalization at all on capital transactions. This factor might have been a major one behind the relatively stable exchange rate behaviour during the floating period.

2.6 Empirical Studies

A number of factors are advanced in theoretical literature as the possible determinants of a country's choice of the exchange rate regime. Studies have been undertaken to test whether considerations noted in theoretical analysis have actually influenced the choice of exchange rate system. Wickham (1985) gives a brief survey of the results of the early empirical studies by Holden and Holden (1976) and Heller (1978) both of which used the discriminant analysis[16] and also by Dreyer (1978) which used the probit analysis[17]. These are pure cross-section studies, which may be criticized for relying on data for just one particular year. Bosco (1987), however, avoids that problem by pooling both cross-section and time series data and he studied the issue by using the logit analysis approach.[18]

Irrespective of the alternative techniques employed by the various authors, the evidence that emerged from these studies has been broadly supportive of the theoretical literature on the subject, i.e., on the one hand, the degree of openness, financial integration, and differential inflation influence the general choice of a country between pegging and floating, and, on the other hand, the decision between a single currency peg and a basket peg is affected largely by the degree of geographical concentration of trade.

While the above studies empirically tested the choice of exchange rate regime by LDCs[19] on the basis of the several criteria advanced in the literature, Weil (1987) concentrated on just one criterion, namely, the degree of geographical concentration of trade. For countries with different exchange rate regimes,the author conducted simple tests for the difference in the mean percentage of trade done with major currency area, and reported a number of interesting results as noted below.

Weil, as expected, found that basket-pegging nations have a higher degree of geographical trade diversification than that for the single currency peggers. However, the LDCs in general experienced an improved trade diversification since 1976. But what really mattered in the switching away from the single currency pegging was the initial degree of trade diversification rather than the changes in trade pattern over the period. This indicates the possibility that countries went through a learning process before they finally abandoned their traditional single currency pegs. But what Weil saw as the learning process could, in fact, conceal the deliberate decisions of authorities stemming from reasons such as the potential depreciation of the effective exchange rate when the peg-currency has been undergoing a depreciation. We saw such a possibility in the initial reluctance of India and Sri Lanka to depart from the traditional sterling peg. Another point emerging from Weil's study is that a number of switches away from the dollar peg that occurred in the first half of the 1980s have been in reaction to the 'over-valuation' of the dollar and not in response to increased geographical trade diversification. This conclusion is consistent with the rise in dollar pegs observed after 1985 following the reversal of dollar's appreciation.

2.7 Summary

We may now summarize the post-Bretton Woods LDC experience of various exchange rate regimes. Firstly, there has been a general move away from single currency pegs to basket pegs and to more flexible exchange rate arrangements. However, the SDR peg is on the decline. Among the remaining single currency pegs, dollar pegs are the most common, the French franc pegs are the most stable and there exists no sterling peg any more. By March

1988 about 45 per cent of LDCs followed a single currency peg down from 89 per cent during March-July 1973.

Secondly, a lack of stability is observed in exchange rate regimes of a number of LDCs which is largely associated with the cyclical fluctuations in the value of the U.S. dollar, leading to erratic switches from and toward dollar pegs. Another reason for the sudden changes in exchange rate regimes appears to be associated with the use of the exchange rate as an anti-inflationary weapon.

Thirdly, among the flexible exchange rate regimes of LDCs, the most interesting appears to be the discretionary crawling peg where the authorities act to bring about gradual adjustments in exchange rate against either a given basket of currencies or against a single major currency without any pre-announced rules. There has also been a number of cautious experiments in free floating by LDCs in the 1980s, most of them with the support of the IMF adjustment programmes. It is too early to assess the full implications of this development but there is evidence to state that they are not strictly pure floating and they do not constitute a repudiation of the existing theory of LDC exchange rate regime.

Finally, the empirical studies of the LDC exchange rate regimes have generally supported the arguments raised in theoretical literature regarding the various determinants of an exchange rate regime. Concentrating on the major factor of geographical trade diversification, it has been noted that LDCs as a whole have undergone improvements in the pattern of trade. In that context, switches from single currency pegs are explained more by the previous degree of trade diversification rather than the existing pattern. Although this is explained by an underlying learning process in the switch from single currency peg, one could also detect other considerations such as the likely depreciation of effective exchange rate that the existing single currency peg could involve. Another factor which is not related to trade diversification behind the switches from the single currency peg is the dollar 'over-valuation' in the first half of the 1980s and this influence is confirmed by the rise in dollar pegs with the depreciation of the dollar after 1985.

Thus, we have seen in this chapter that there are a number of exchange rate systems that are in operation in LDCs. Although we described the various LDC exchange rate regimes, we did not examine them for their economic grounds. In order to examine the economic rationale of alternative exchange rate regimes we turn to the next chapter.

Footnotes: Chapter 2

1. It may be noted that the floating exchange rate system adopted by developed countries since the early 1970s has not been completely free floating but rather managed floating with varying degrees of central bank intervention.
2. For India, a more detailed analysis of the introduction of the sterling peg is given in Chapter 4.
3. Mali joined the CFA franc system in June 1984 by becoming a member of the West African Monetary Union (WAMU).
4. See African Department Study Group (1969) for a detailed study of the CFA franc system.
5. The 'cross-pegging' is the practice of pegging the value of the domestic currency simultaneously to more than one foreign currency at rates which are inconsistent with the cross rates between the foreign currencies. The cross pegging results in broken cross rates leaving the scope for arbitrage.
6. Comoros has an independent currency called Comorin franc but its value is kept the same as that of CFA franc and is linked to the French franc at 50 to one. Equitorial Guinea's currency is CFA franc. Mali joined the CFA franc system in June 1984 although she kept a fixed relationship with the CFA franc and therefore the French franc even earlier.
7. The only country on the sterling peg for the previous several years, viz., the Gambia, abolished it in January 1986 in favour of a floating exchange rate system.
8. Sierra Leone floated its currency during an intermediate period from June 1986 to August 1987.
9. There are, however, three countries which switched away from the dollar

peg during 1985-88, viz., Egypt which adopted a managed floating, Ghana which floated independently, and Libya which pegged to the SDR with large margins of ±7.25 per cent.

10. See Gerakis (1976) for a study of the exchange rate practices of some Middle Eastern countries during 1975.

11. Williamson quotes the instance of Sudanese cotton whose export price, although set in world markets in terms of the dollar, could go up by an appreciation of the DM against the dollar via a rise in the German dollar demand price for cotton. Here, the influence of Germany on the price of the homogeneous commodity, cotton, depends not upon the share of that country in Sudan's exports of cotton but rather on her share in world trade in cotton.

12. See chapter 4 for the detailed study on the Indian basket system.

13. It may also be noted that Burundi and Jordan which are officially-designated SDR peggers have recently started adjusting gradually against the SDR basket.

14. Exceptions are Lebanon, South Africa and Uruguay. Of the three, Lebanon has highly developed financial markets which are integrated internationally and the country has had extensive experience in independent floating ever since 1952.

15. See the more detailed analysis in Chapter 3.

16. The discriminant analysis belongs to a class of regression techniques where the model is estimated with the dependent variable as a dummy variable. The alternative approaches under this broad group of methods are the logit, probit and the tobit analyses. See Maddala (1988) pp. 267-289 for a good exposition of these techniques. See also Bosco (1987) for a comparison of the studies by Heller (1978) and Dreyer (1978).

17.See Footnote 16.

18.See Footnote 16.

19.Heller (1978) had both LDCs and developed countries in the sample whereas other studies considered only LDCs.

Chapter 3

The Theory of LDC Exchange Rate Regimes

3.1 Introduction

The review in the previous chapter of the post-Bretton Woods LDC exchange rate practices has not shown an altogether satisfactory state of affairs. We noted a number of cases of erratic shifts in exchange rate regimes. There appears to be a general lack of clear understanding among LDCs of what an exchange rate regime is expected to achieve. Can theory provide guidance for LDCs in the choice of an appropriate exchange rate regime?

There are broadly three main strands in the literature on exchange rate regimes. Of the three, the first has been initiated by Friedman (1953) as a critique of the orthodoxy of the Bretton Woods 'adjustable peg' system and the second is the theory of optimum currency areas which originated with the work of Mundell (1961). The former proceeded as if the optimal exchange rate regime is universally applicable to all countries[1], the latter mainly emphasized certain criteria the satisfaction of which varies from country to country (Ishiyama, 1975). A significant aspect of the contributions under the above two streams has been that they were made largely in the context of developed countries and, therefore, abstracted from the special problems of the large number of LDCs. This gap, however, has been filled since the mid-1970s by the emergence of a third strand of literature on the issue of the optimal exchange rate regime for a typical LDC. This body of literature stresses the special characteristics of LDCs and place the choice of exchange rate regime within the context of the differentiating features of those countries.

There has been already two surveys of the extensive literature on the LDC exchange rate regime by Williamson (1982) and Wickham (1985). The purpose of this chapter is, therefore, not exactly to undertake yet another survey. We propose, rather, to synthesize the existing literature on the subject with a view to bringing forth general principles that should guide LDCs in their choice of exchange rate regime.

3.2 The Background

The theory of exchange rate regimes for LDCs was developed in the context of the generalized floating of world's major convertible currencies. The question was asked: what is the optimal exchange rate arrangement for an LDC given that the major currencies of the world are floating against one another? Three alternatives were foreseen: (1) to join the system of developed countries by accepting an independent floating[2]; (2) to peg the home currency to the currency of the most predominant trading partner; and (3) to peg to a currency basket which can be either the SDR or a self-chosen basket. Professional opinion has been generally in favour of the third option.

Two questions arise from the professional consensus on the optimal exchange rate regime for the LDC: first, why pegging is preferable to floating for the LDC? and second, why a multi-currency peg is considered superior to a single currency peg? At the time of the generalized move towards a floating exchange rate system in the early 1970s, there existed a fairly consistent corpus of literature in favour of floating[3]. We need to examine those arguments and ask why they are not quite relevant as far as the LDCs are concerned. In addition, we have to examine the arguments for the basket peg and see why a single currency peg is not ideal for the LDC.

3.3 Feasibility of Floating in LDCs

The major argument put forward in the earlier literature for a floating exchange rate system has been that it could resolve the policy dilemma between the objectives of external balance and internal balance by ensuring, on the one hand, automatic external balance by appropriate movements in exchange rates and, on the other hand, unconstrained freedom to use macroeconomic policies particularly the monetary policy for the attainment of internal balance. In addition, free floating was claimed to insulate the economy from external shocks not merely monetary but real as well[4]. The experience of floating in developed countries, however, proved that the above claims of floaters had been much exaggerated and the new asset-market approach to exchange rate determination provides fresh insight into why the reality turned out to be different from the earlier thinking (see Williamson, 1985b). However, our concern for the moment is not with regard to the applicability of the arguments of floaters for developed countries[5] but rather why a flexible exchange rate system is not relevant to developing countries prima facie?

The absence in most LDCs of a financial infrastructure which is well-developed internally and well-integrated with the international financial markets has been stressed by a number of authors (e.g. Black, 1976; Crockett and Nsouli, 1977; and Branson and Katseli, 1981). In these countries, the financial system consists of mainly the central bank and the commercial banks, the latter under the strict surveillance and control of the former; interest rates and exchange rates are administratively fixed and with rarely any relation between the two; forward markets in foreign exchange are virtually non-existent; and with an elaborate system of trade and exchange controls, private capital flows are strictly regulated.

Branson and Katseli note, invoking the asset-market view, that the short-term stability of the exchange rate depends upon the overall stability of the financial markets, which in turn assumes a domestic financial system of certain depth and breadth and the absence of capital controls to ensure substitutability between domestic and foreign assets in private portfolios. The authors argue that, in absence of such asset market conditions for equilibrium, the exchange rate in those countries will be determined by current account flows, i.e., by the supply and demand in foreign exchange market arising mainly from exports and imports. In that context, the short-run exchange rate stability requires the satisfaction of the Marshall-Lerner conditions on trade elasticities.

Branson (1983) has made a four-fold classification of countries based on their trade structure. First is the "small country" case with perfectly elastic demand and supply curves for exports and imports respectively. Here, exchange rate changes have no effect on the terms of trade and desirable effects on the trade balance which ensures stability in foreign exchange markets. The second is the "semismall country" case which is small on the import side, i.e., with perfect import supply elasticity, but large on the export side with some market power to influence prices. Here, a devaluation, for instance, reduces the terms of trade and, with inadequate demand elasticity of exports and imports, can cause J-curve effects and thereby dynamic instability in exchange markets. The third is the "rigid country" similar to Crockett and Nsouli's (1977, p.126) case of very limited substitutability between traded and non-traded goods resulting in inelastic export supply and import demand. Here, devaluation does not affect the terms of trade as both the export and import prices move up by the same proportion, but worsens an initial trade deficit. The last is the "pure manufacturing country" case where imports are largely intermediate inputs with relatively inelastic demand and, exports are manufacturing output with a positive supply elasticity. With inelastic demand for exports, devaluation in this case worsens trade balance and also leads to deterioration of the terms of trade.

The conclusion from the above classification of countries is that the Marshall-Lerner (M-L) conditions for short-run exchange rate stability is likely to be satisfied only in the case of small countries and therefore surprisingly, such countries alone could float. However, Branson and Katseli point out that the satisfaction of the M-L conditions is only a necessary condition for floating and not a sufficient condition. The feasibility of floating also depends on the degree of openness of the economy concerned as explained below.

The openness criterion is borrowed from the literature on optimum currency areas. McKinnon (1963) argued that in the context of a small open economy exchange rate flexibility could lead to price instability which could threaten the citizens' confidence in domestic currency, leading to substitution of foreign currency for domestic currency. Besides, the more open the economy the less effective is the exchange rate as an instrument of external adjustment, an argument stemming from the absence of money illusion, the existence of real wage rigidity and also inelastic domestic demand for imports (see Ishiyama, 1975, pp.350-2). Therefore, although floating is feasible for a small country on the grounds of Marshall-Lerner conditions, it is not feasible for such a country on the grounds of openness.

Reverting to the relationship between financial structure and feasibility of floating, it has been argued by Lal (1980, p.33) that the absence in LDCs of a full-blown financial system sufficiently integrated internationally *per se* is not an argument against the flexible exchange rate in these countries, but rather an argument in favour of carrying out financial reforms thereby enabling the floating rate system to operate more efficiently in these countries.

McKinnon (1979, pp.271-2) also advocates such a deliberate reform in developing countries so as to encourage currency convertibility in these countries. Crockett and Nsouli (op.cit., p.138) particularly refer to the absence of forward markets in LDCs and suggest that, for the fast development of such markets government has to give up once and for all its exchange rate stabilization function through pegging the exchange rate, and instead allow the inevitable fluctuations for some time in order to offer sufficient incentives to private operators to step in. Black (1976) also admits that free floating requires official commitment of considerable resources for development of exchange markets and related financial markets in LDCs and also the abandonment of exchange controls.

There is a lot of merit in the above arguments, but the basic point is whether LDCs should straightaway encourage external capital mobility in the hope that it would make the floating exchange rate system feasible. The answer depends upon whether private speculation is stabilizing or destablizing. Friedman (1953) argued that private speculation is destabilizing only if the market is consistently dominated by amateurs who buy when price is high and sell when it is low. This is countered by saying that rational speculators can buy when price is high if they expect it to go further up and sell when it is low if they expect it to go further down and thereby destablize the market (Hart and Kreps, 1986, pp. 927-52, for a mathematical proof).

Perhaps the best picture of the destabilizing effect of capital mobility is provided by the "overshooting" of exchange rates. The overshooting phenomenon was originally presented by Dornbusch (1976) as resulting from the much slower adjustments to disturbances in goods and labour markets than those in financial markets. That is, as the prices in goods and labour markets are sluggish in response to shocks, financial prices bear the brunt of adjustment in the short run by responding much larger than needed in the long run. The experience of the last one and a half decades of floating has shown that overshooting of exchange rates from the levels indicated by fundamentals is not just a short run occurrence, but could last for several years at a stretch leading to what is termed as "misalignment". Williamson (1985a, pp.47-55) points out that misalignments of exchange rates have occurred not just because of the macroeconomic stances of national authorities but also because of the inefficiency of financial markets[6].

We may now summarize the arguments for the feasibility of floating in LDCs developed so far: the underdeveloped nature of the financial markets and the absence of capital mobility preclude the determination of short-run exchange rate equilibrium through asset markets in LDCs. But the stage of development of capital markets is a function of government policy and controls. However, even if LDC governments decide to promote the speedy development of these markets and allow freedom to private agents to exercise their portfolio choice including foreign assets, that need not provide a sufficient condition for stabilization in exchange markets as private speculation could very well be destabilizing as it could be stabilizing. If we ignore the asset markets, the exchange rate stability in the event of floating in these countries depends on whether the Marshall-Lerner conditions hold or not. We saw that they hold in the case of small countries but not in semi-small countries who possess some market power on the export side or any other types of developing countries. In the case of small countries although they are feasible floaters on the grounds of Marshall-Lerner conditions they are likely to be so open as to make floating an unworkable proposition.

3.4 Desirability of Pegging in LDCs

While Branson and Katseli were mainly concerned with the feasibility of floating in LDCs, other authors analysed the desirability of floating for this group of countries. The question addressed in this connection has been, which exchange rate regime is best suited for macroeconomic stability given the origin and nature of shocks the economy is frequently subject to? .This is, in fact, an extension of the debate on the insulation advantages of alternative exchange rate regimes started by Friedman (1953).

New studies on developed countries have shown how floating exchange rates cannot insulate the domestic economy from all types of stochastic disturbances as claimed earlier. (See I.M.F., 1984b, for a brief survey). In the presence of high international capital mobility, it is pointed out, that floating rates cannot protect individual countries from foreign macroeconomic policy shifts. For example, a foreign monetary expansion could lead to appreciation of domestic currency through the channel of capital inflows prompted by a decline in foreign interest rate. This would cause a fall in domestic output through trade account. Similarly, a foreign fiscal policy change could affect domestic output (See Mussa, 1979, for details). Although floating rates have potentiality for providing insulation against world price level shocks through appropriate changes in exchange rates, they cannot offer effective insulation against relative price changes of different classes of traded goods (e.g., oil or food). There has been a number of empirical studies showing that the floating period has been characterized by a greater transmission of disturbances among industrial countries (see e.g. Swoboda, 1983; De Grauwe and Fratianni, 1985; and Obstfeld, 1985).

The analysis of short-term macroeconomic stabilization in an open economy has generally been conducted within the framework of the Mundell-Fleming model which in turn is the open economy version of the Keynesian IS-LM model. The appropriateness of such a framework in analysing LDC stabilization problems is questioned. Basically, the IS-LM framework represents demand-constrained models whereas the typical LDC is supply-constrained. The studies on LDCs naturally abstracts from external capital mobility and also assume exogenous supply conditions, and within this framework, examine the relative performance of fixed and flexible exchange rates in the presence of various types of exogenous disturbances.

There is, however, a major difference among the various LDC studies which relates to the definition of internal balance employed by the different authors. Black (1976) considers the domestic price as the strategic variable to be stablized in a two-good model of traded and nontraded goods. Black demonstrated that flexible exchange rate could insulate the economy from fluctuations in world prices of tradables. For example, if there is a rise in world price relative to domestic price, the resulting appreciation of the exchange rate would keep the domestic price of tradables intact. If the exchange rate were pegged, that would raise the domestic price of tradables and thereby produce a balance of payments surplus leading to reserve growth and monetary expansion.

However, it was shown by Black that, in the presence of domestic supply shocks for example, a crop failure, macroeconomic stability could be preserved better under a fixed exchange rate than under a flexible exchange rate. A fixed exchange rate, by holding down the domestic price of tradables, diverts demand to the tradables sector (including imports) and helps to contain the rise in the price of nontradables. If the exchange rate were flexible, the resulting depreciation, while raising the price of tradables, would not help in containing the rise in the price of nontradables. It may, however, be noted here that the effectiveness of the fixed exchange rate in preserving internal balance presupposes adequate stock of external reserves or the possibility of external borrowing.

Another type of exogenous shock which is of crucial importance to LDCs is adverse shifts in the terms of trade arising from either a decline in export prices or a rise in import prices. The relevant case is when import demand is inelastic. In such a case, Black showed that a pegged exchange rate regime is superior in the face of sudden movements in the terms of trade. It minimizes the effect on domestic prices by keeping the exchange rate stable. Under flexible exchange rates a fall in the terms of trade, for instance, through a rise in import prices, would be translated into a rise in domestic prices via exchange rate depreciation.

Lipschitz (1978) treats real absorption, assumed to be a function of real output and excess real money balances, as the crucial variable to be stabilized. He does not, however, make a distinction between tradables and nontradables as Black did, but considers a simple tradable good model in which output is exogenously determined. The author examines two types of transitory shocks facing the economy: domestic supply and domestic money demand shocks. Lipschitz finds that in the face of output shocks, a pegged exchange rate regime is superior in stabilizing real absorption. The argument is that in a fixed rate regime, real absorption can be maintained through a trade deficit financed by foreign reserves changes whereas under a flexible rate regime, absorption will be limited to the level of output. A shock from the demand for money side, on the other hand, needs a flexible exchange rate to preserve domestic absorption. For example, a rise in real demand for money brings out an appreciation of the exchange rate which raises the supply of real money balances through a valuation effect on the foreign exchange component of money supply, and thereby eliminates the initial monetary disequilibrium (see Lipschitz op. cit., pp. 653-6, for details).

Flanders and Helpman (1978) are concerned with the determination of the choice between the two polar alternatives of a rigidly pegged exchange rate and a perfectly flexible exchange rate for a small open country producing both tradables and nontradables. Take the case when wages and prices of nontradables are flexible. Then, if there are external disturbances in the form of changes in foreign prices of traded goods, a flexible exchange rate could maintain domestic price stability and thereby enhance the "moneyness" of the domestic currency whereas a fixed exchange rate results in price instability. It may be noted, however, that this conclusion runs counter to what McKinnon and Branson & Katseli stated[7]. But this result is consistent with that of Black.

Now let us consider the more interesting case where money wages and nontraded goods prices are rigid downwards. Here as well, Flanders and Helpman demonstrate that a flexible exchange rate ensures the preservation of price stability in the face of changes in foreign prices, upward or downward, and in that sense exchange rate flexibility compensates for the absence of wage-price flexibility. If the exchange rate is pegged, the results depend upon the direction of the foreign price change. If the foreign prices rise they are transmitted home. If the foreign prices fall, under fixed exchange rate, the price of traded goods falls but the price of nontraded goods and money wages remain constant. If monetary policy is directed toward preserving balance of payments equilibrium, that will result in unemployment. If monetary policy is directed toward maintaining full employment, that would adversely affect balance of payments. This is the familiar dilemma situation of conflict between internal and external balance.

The above theoretical discussion indicates that the nature of transitory shocks facing the economy is an important determinant of the optimal exchange rate regime. Shocks are generally categorized as either real or monetary. If real shocks (e.g., shocks originating from domestic supply or external terms of trade) predominate, a pegged exchange rate regime is superior; if monetary shocks (e.g., shocks arising from foreign price level, domestic demand for or supply of money) predominate, a flexible exchange rate regime is superior[8]. The desirability of a pegged exchange rate regime as opposed to a flexible regime in LDCs stems from the fact that these countries are characterized by the predominance of real shocks, particularly arising from domestic supply and the terms of trade.

Domestic supply shocks occur in LDCs mainly due to harvest failures. A general harvest failure could affect either a nontradable or importable good (e.g., foodgrains) or an important exportable good (e.g., tea, coffee and cocoa). In the case of the former, a pegged exchange rate regime stabilizes the domestic price *à la* Black and domestic consumption *à la* Lipschitz. In a number of LDCs an agricultural supply failure normally triggers off inflation in the economy quite strongly through its impact on expectations[9]. In such a context, a fixed exchange rate regime would help to counter inflation through the cushion of trade balance. A flexible exchange rate system, in contrast, would worsen the domestic inflationary situation by a depreciation making the domestic price of all imports go high.

In the face of domestic supply shocks affecting the production of an important exportable good, the case for a pegged exchange rate regime becomes even stronger. As in the case of an essential consumption good, here too a fixed exchange rate helps in minimizing the instability of domestic price and domestic consumption. A flexible exchange rate while precluding the maintenance of internal balance does not help towards the objective of external balance either. This is so because of the impossibility of eliciting supply response with exchange rate changes in primary producing countries subject to a general harvest failure.

Turning to the terms of trade shock arising from price fluctuations in particular importables (e.g., oil or foodgrains) or exportables as distinguished from fluctuations in the world price level, a flexible exchange rate fails to provide insulation to the domestic economy since it cannot alter relative prices at such a disaggregated level. Provided such a disturbance is temporary[10], a fixed exchange rate regime with the provision for financing of deficit on current account either through dishoarding of foreign reserves or foreign borrowing or a combination of the two is better in the sense that such a policy at least prevents further changes in domestic price and consumption. This is particularly significant for primary product exporters subject to price shocks influenced by periods of boom and slump in industrial countries.

The above discussion while applicable to many LDCs, it needs to be emphasised ~~that,~~ ~~it~~ is not applicable with the same force to all LDCs. A distinction has to be made as between primary producing but food importing nations and those LDCs which are manufacturing but food self-sufficient. Let us call the former category of LDCs the 'pure LDCs' and the latter category the 'manufacturing LDCs'. The above analysis is not quite relevant to the manufacturing LDCs. India is a typical example of the manufacturing LDC. She is categorized by the IMF as a 'Manufacturing Product Exporting LDC' with the share of manufacturer's much above the cut-off point of 50 per cent of aggregate exports. Besides, the country is self-sufficient in foodgrains production and also do not require food imports in the event of even a massive crop failure.

In the context of manufacturing LDCs, if a general crop failure occurs affecting the production of importable foodgrains and exportable primary commodities, the appropriateness of a fixed exchange rate is not that evident. Firstly, the release of foodgrains from stocks within the country, from the government buffer stocks, could minimize consumption decline and hold down the price rise. Secondly, the fall in primary commodity exports could be compensated by a rise in manufactured exports if the exchange rate depreciates. The argument relating to the terms of trade shocks also has less force in manufacturing LDCs as, with the low share of primary commodity exports, the impact on the economy of a fall in export price of primary products is much less in these countries. However, in these countries, sudden rises in import prices which are temporary can be tackled better with a fixed exchange rate than a flexible exchange rate.

To sum up the discussion on the desirability of a pegged exchange rate regime for the LDC: domestic supply shocks due to harvest failures and the terms of trade fluctuations arising from either a rise in import prices or a fall in export prices constitute the major type of exogeneous disturbances confronting LDCs. In that context, a fixed exchange rate regime is preferred to a flexible rate regime. A fixed exchange rate with the provision for financing the temporary balance of payments gap arising from such disturbances, could enable these countries to maintain price stability and preserve domestic absorption. In this connection, it is pointed out that the IMF's Compensatory Financing Facility (CFF) for export shortfalls and for excess cereal imports and the European Community's Stabex scheme are, in fact, meant to help nations to tide over temporary exogenous shocks of the type mentioned above by providng short-term balance of payments support as well as assistance to stabilize domestic absorption (Wickham, 1985, p.268). We have, however, noted that the strength of the above argument for the fixed exchange rate regime for LDCs is considerably reduced when we consider the small group of LCDs for whom manufacturing product exports constitute a large portion of total exports and who are self-sufficient in food production requiring no import of foodgrains in the event of a huge crop loss.

In the above discussion, we have assumed away the economic costs of exchange rate instability resulting from a flexible exchange rate regime. The neglect of this cost of flexible exchange rates is quite evident in the literature on optimal exchange rate regime. This is perhaps due to the majority academic belief that prevailed on the eve of generalized floating that, the flexible exchange rate system would result in smoothly adjusting exchange rates responding only to changes in underlying economic conditions (Johnson, 1972, pp.208-11). Experience, on the other hand, proved that floating exchange rates are associated with very high short-term volatility of exchange rates (see I.M.F., 1984b). The econometric studies on the impact of short-term exchange rate instability on trade flows particularly in developed countries, however, have not produced conclusive evidence although there are some individual studies showing the evidence of depressing effects on trade[11]. The main explanations offered for the lack of a firm relationship between exchange rate instability and international trade are: (i) the recourse to substantial hedging in forward markets; (ii) the relatively inelastic short-term supplies of exports; (iii) the diversification of trade into different currency blocs; and (iv) the risk reduction through diversification of the asset portfolios of international trading firms (see McCulloch, 1983 and Willett, 1986). While all these factors have been operating in most of the developed countries, the importance of these factors except (ii) is much less evident in LDCs[12]. As a result, exchange rate volatility accompanying flexible exchange rates has been much more problematic in LDCs than in developed countries. The high cost of exchange rate instability on exports is demonstrated for India quite clearly in Chapter 9. This is yet another argument for the desirability of a pegged exchange rate system for LDCs.

The exchange rate instability argument for a fixed exchange rate regime in LDCs is further buttressed by the lack of a mature and internationally integrated financial market in these countries. In the absence of sound and externally integrated financial markets, flexible exchange rates are likely to be much more unstable than otherwise. This is clear from our earlier discussion.

There is yet another aspect to the relevance of a pegged regime in LDCs. One of the major reasons why floating became inevitable for developed nations was due to the progressive lifting of controls on capital movements among them. When there is free movement of capital across countries, there is also the danger of destabilizing speculation in the midst of which pegged exchange rates are virtually impossible. In the context of most of LDCs, on the other hand, capital mobility is quite restricted with the maintenance of trade and exchange controls. This is admittedly not an ideal situation. However, this fact bestows on these countries the capacity to maintain a pegged exchange rate regime. Thus we may state that, whereas in developed countries a fixed exchange rate regime is infeasible due to capital mobility, it is feasible in most LDCs due to the existence of capital controls.

3.5 Optimal Peg for LDCs

After having examined the infeasibility of floating and the desirability of pegging for LDCs, the next issue to be considered is the choice of the peg, i.e., whether the peg should be based on a single currency or should it be based on a currency composite. Again, if the choice is in favour of a multi-currency peg, the question arises as to the choice of currencies and the principle by which weights are assigned to the chosen currencies. This is the issue of optional peg for LDCs.

The choice of optimal peg is to be conceptually distinguished from the choice between floating and pegging which was discussed in the previous sections. Williamson (1982) makes the distinction clear when he says, "There appears to be wide agreement that independent floating is either infeasible or undesirable for most developing countries, ... In a world where the major currencies are floating against one another, however, the question of exchange rate policy is not solved by resolving to peg rather than to float; it is also necessary to decide to what to peg" (p.39). When we keep the choice of peg separate from the choice of float versus peg, then it implies that the considerations that influence the former are also different from those that determine the latter.

The idea of a single-currency peg has been known since the 1930s when the world was divided into various currency blocs after the breakdown of the international gold standard. The majority of nations generally tied their home currency to one of the major currencies such as sterling, the dollar or the French franc depending on the political and economic relationship they had with the U.K., the U.S. or France respectively. In contrast, the post-World War II period up to 1971 based on Bretton Woods par value system particulary since the establishment of convertibility of major currencies offered a multilateral framework. As a consequence, most LDCs diversified their external transactions considerably. In that context, when the world's major currencies floated in the early 1970s, the choice of an appropriate exchange rate system for LDCs was not as simple as in 1930s when international economic relations were much less diversified. Under conditions of trade and financial diversification and flexible exchange rates among major currencies, pegging to a major currency would imply floatng against all other currencies which are themselves not pegged to that major currency. This in turn results in fluctuations in the home currency's effective exchange rate[13], i.e., the average of the bilateral exchange rates, which has nothing to do with the balance of payment positions of the home country. In short, the multi-currency peg or the basket peg is suggested as the optimal exchange rate regime for a small country as an instrument to avoid the unnecessary and often harmful variations in its effective exchange rate (Diaz-Alejandro, 1975).

3.5.1 The Early Origin of Basket Peg

The origin of the idea of a basket peg can perhaps be traced back to Marshall (1887) who recommended a symmetallic standard as a better alternative to the pure gold, silver and bimetallic standards. Marshall suggested such a monetary standard in the context of the rapidly falling gold value of silver. Harrod (1969, p.21) explained Marshall's scheme as consisting "not of a certain weight of gold, not of a certain weight of silver, not of certain weight of gold or certain weight of silver, but of a certain weight of gold plus a certain weight of silver". The idea behind the symmetallic standard was that in the context of the falling value of silver against gold, linking a country's currency with an average value of gold and silver would produce a more stable system than that based on either gold or silver.

The world monetary system did not evolve the way Marshall would have liked. However, in the early 1970s when world's major currencies moved to a flexible exchange rate system, several developing countries began to accept multi-currency pegging systems[14] which in fact constituted a return to the spirit of the Marshallian symmetallism.[15]

3.5.2 The Rationale of the Basket Peg

A basket peg involves the currencies of the major trading partners of the home country of which one is chosen as the numeraire which usually is the currency of the most important trading partner. The underlying logic of the operation of the basket peg is as follows: if the home currency price is moved in the same direction and extent as the movement in the average price of foreign currencies, both the former and the latter measured in terms of the selected numeraire which is usually the intervention currency, then the externally imposed disturbances due to third-country currency fluctuations on the home economy is completely eliminated. This is expressed algebraically below:

$$\dot{e} = \sum_{i=1}^{n} w_i \dot{r}_i$$

where e = home currency price in terms of numeraire

r_i = price of i^{th} foreign currency in terms of numeraire

w_i = weight given to the i^{th} currency ($\sum_{i=1}^{n} w_i = 1$)[16]

n = number of currencies in the basket

. indicate percentage change.

Thus pegging to a currency basket implies keeping the domestic currency price of the arbitrarily chosen numeraire on a path given by the weighted average of the foreign currency prices of the numeraire. This in turn leads to the stabilization of an appropriately defined effective exchange rate of the home country.

What do the stabilization of effective exchange rate really mean? Unfortunately, there is no agreement in literature on this issue. The basic disagreement is on the precise concept of effective exchange rate that is to be stabilized by the pegging. The lack of consensus on the underlying objective of the optimal peg for the LDC[17] is brought out in Williamson's survey mentioned earlier. We reproduce it below in Table 3.1 in roughly the same form given by Williamson with some updating.

Table 3.1, first of all, indicates that every author except Connolly has the stabilization of effective exchange rate (EER), either nominal or real, as the prime objective of optimal peg. But the authors think differently about what is supposed to be achieved by stabilizing EER. Except Black and Connolly, every other author proposed the possibility of alternative objectives that can be served by the basket peg. Some of the objectives suggested are the stabilization of relative prices of traded goods and thus resource allocation (Black and Lipschitz), balance of trade or current account (Crockett and Nsouli, Flanders and Helpman, Lipschitz and Sundararajan, and Branson and Katseli), output or real income (Crockett and Nsouli, and Flanders and Helpman), income distribution (Lipschitz) and the terms of trade (Lipschitz and Sunderarajan, and Branson and Katseli). The dissimilarity in objectives assumed by various authors is also reflected in the weighting systems recommended by them for the basket peg. This is hardly an ideal state of affairs. This makes the task of policy makers very difficult. There is a need to examine the issue *de novo* in order to decide who is right. Fortunately, Williamson does precisely that.

Williamson straightaway rejects three objectives of the choice of peg mentioned in the literature as "unambiguously erroneous". They are the stabilization of the level of real income and the terms of trade and the minimization of the rate of inflation. The argument for rejecting the first two criteria is that their acceptance would lead to unnecessarily throwing away potential windfalls that comes in the form of rise in real income through rise in the terms of trade. That would involve, in the words of Williamson, cutting down the peaks without raising the floors which is not a sensible thing to do.

Table 3.1

Objectives of LDC Exchange Rate Policy and Recommended Pegs in the Literature

Author(s)	Suggested Objective	Recommended Peg
1. Black (1976)	Minimize variance of relative prices of traded goods by stabilizing effective exchange rate (EER)	Peg to a basket with weights based on direction of total trade in goods and services. Elasticity weights are suggested for country with market power
2. Crockett and Nsouli (1977)	Stabilize balance of trade and output by stabilizing EER	Peg to import-weighted basket. SDR peg is suggested as a good proxy for import-weighted basket.
3. Flanders and Helpman (1979)	(i) Minimize variance of the balance of trade by stabilizing the EER with Multilateral Exchange Rate Model (MERM)-type weights. An improvement in balance of trade is also envisaged as an additional objective.	Peg to an elasticity-weighted basket. An increase in trade balance over time is brought about by increasing the weights of currencies expected to depreciate.
	(ii) Minimize variance of real income	Peg to a basket with large weights for export markets and small and even negative weights for import sources.
4. Lipschitz (1979)	Minimize variations in resource allocation and income distribution, by stabilizing real effective exchange rate (REER)	Peg to a basket with weights based on currency denomination of total trade when export and import-competing sectors are of similar size.
5. Bacha (1979)	Stabilize REER in order to avoid externally imposed instability.	Basket peg of some sort.

Author(s)	Suggested Objective	Recommended Peg
6. Lipschitz and Sundararajan (1980a, 1980b, 1982)	Stabilize REER with the aim of stabilizing the terms of trade or trade balance	Peg to elasticity-weighted basket modified by covariance between relative prices and exchange rates
7. Branson and Katseli (1981)	Consider stabilizing EER with the aim of stabilizing the terms of trade, relative prices of traded goods or trade balance.	Peg to basket with weights appropriate to the respective objective determined as special cases from a MERM-type model.
8. Branson and Katseli (1982)	Consider stabilizing REER with the aim of stabilizing the terms of trade,relative price of traded goods or trade balance.	Peg to basket with weights depending on the particular objective. The basket weights are derived as special cases of MERM-type model.
9. Connolly (1982, 1983)	Minimize the level and variability of inflation	Peg to trade-weighted basket. However, the retention of single U.S. dollar peg is advised for Latin American countries mainly to avoid the jolt to confidence that could occur with the break of the historical tie with U.S. dollar and also due to the better performance of U.S. with regard to inflation.

Source: Based on Williamson (1982), Table 1, p. 50, as updated.

The minimization of inflation as the crucial objective of a small country exchange rate policy suggested by Connolly is, in fact, the application of the classic "discipline argument" in favour of a fixed exchange rate, i.e., if you maintain parity with respect to the currency of another country, that would necessitate the maintenance of a rate of inflation in home country neither above nor below that in the other country. But the argument against such a policy is that it leads to an avoidable sacrifice of domestic policy autonomy to choose whatever level of inflation the country prefers[18]. A better policy strategy would be to decide the choice of the peg based on other considerations and accept a change in the level of the peg in order to neutralize the inflation differential between home country and its trading partners. On the other hand, if it is felt that the resulting home inflation is larger than the desired, then the country can subject itself to external discipline, if it so believes, by effecting an appreciation against the chosen peg.

After rejecting some of the objectives of the optimal peg advanced in the literature, Williamson suggests that the precise motivation for the optimal peg is the preservation of "internal balance". However, the proper definition of internal balance depends upon the true model of the economy. To quote Williamson, "In a Keynesian fixprice variable output model, extended to incorporate an expectations-augmented Phillips curve, internal balance can be identified with the natural rate of unemployment modified by some margin adequate to induce a desired change in the inflation rate. ..... In the dependent economy flexprice full employment model, internal balance is represented by a constant level of output of nontraded goods ...... In both cases it is undesirable to depart from internal balance in response to temporary disturbances." (p.54) Fluctuations in third-currency exchange rates associated with the generalized floating of major currencies constitutes a random shock disrupting the home country's internal balance. The peg has to be so chosen as to insulate the economy from this disturbance. This can be done either through minimizing the instabilty of the relative prices of traded goods and ,therefore, the resource allocation as envisaged by Black and Lipschitz, or through stabilizing output and employment as envisged by Crockett and Nsouli, depending on one's view of the economy under consideration.

The motivation of the choice of a peg described above need to be clearly distinguished from that associated with a change in the value of the peg. A shift in the value at which a currency is pegged is to be directed towards the objective of "external balance". A change in the value of the peg could be envisaged at two levels: the first with a view to just accommodating an inflation differential between home and abroad and the second in order to promote balance of payments adjustment. The former would preserve the constancy of real effective exchange rate, and the latter would involve a change in real effective exchange rate intended towards correcting a balance of payments disequilibrium.

Even if we agree with the above prescription made by Williamson, there still remains two more issues as regards the assignment of weights to the various currencies in the optimal peg. Firstly, whether the weights should be trade-based or elasticity-based? The considered opinion of Williamson is that theoretically the currency weights should be based on balance of trade elasticities computed from a multilateral exchange rate model of the IMF type.[19] However, the practical difficulties in adopting such a weighting system is so huge due to data inadequacies in LDCs that trade weights are the best that are feasible. A further point is that it is the total trade weights that are appropriate and there appears to be no justification for adopting either import weights alone as suggested by Crockett and Nsouli or export weights alone.

The other major issue relating to weighting of currencies in the optimal peg is whether it should be based on the direction of trade or currency of denomination in trade. This issue is particularly signficant in the context of LDC trade being invoiced largely in a few international currencies like the U.S. dollar and sterling. It might seem that the currency share is more appropriate than the trade share since the former determines the current domestic currency value of past trade contracts. That is, the currency denomination of trade is what matters in measuring the immediate impact of currency fluctuations on the domestic currency value of foreign payments and receipts. However, the more relevant consideration for trade decisions is the prices that can be struck for present contracts for future delivery and not the current prices obtained from past contracts. The former depends much more on the cost and price situation in home country in comparison with that in the competing partner country. The trade competitiveness relates to goods from and to the currency country and not to goods of the currency denomination. Therefore, currency weighting in a basket peg should be on the basis of the direction of trade rather than on the currency invoicing[20].

However, it is an important question whether a single-currency peg is preferable to a basket peg for countries whose external transactions are dominated by a single country. In such countries, the basket peg, although stabilizes the effective exchange rate, would imply variation in the most important bilateral rate of the home country. Frankel (1975) suggested a measure which he called the "effective variation" of exchange rates which is the trade-weighted average variability of individual bilateral rates. Using such a measure, Frankel conducted simulation exercises with historical data and compared the single-currency peg with the basket peg. They indicated that in several cases, single-currency pegs minimized effective variation rather than the basket peg. These results may suggest that a basket peg need not be universally applicable and, in certain LDCs, a single-currency peg could be optimal.

The optimality of single-currency peg based on the minimization of "effective variation" of exchange rates can be countered on the grounds of 'trade diversion'. That is, even if the LDC's present trade is highly concentrated with a single country, the continued peg with the currency of that country would come in conflict with the highly desirable policy objective of geographical diversification of that country's trade. (See Joshi, 1979, p.247).

While it is true that the stability of bilateral rates are more important for individual traders, the stability of the effective exchange rate is important for the trading sector as a whole. As stressed by Black (1976, pp. 13-14), the choice between trade and production of nontraded goods is an important one in the long run which is influenced by the stability of the prices of traded goods in general. In that context, the stability of the effective exchange rate by protecting the profitability of traded goods sector in relation to the nontraded goods sector from third currency fluctuations, eliminates the anti-trade bias of currency fluctuations.

3.5.3 A Crawling Basket Peg for LDCs?

The earlier discussion of the optimal exchange rate regime for the LDC yielded the conclusion that a basket peg is suited to most of these countries in normal circumstances. However, the underlying economic circumstances undergo changes. For example, there could occur upward shifts in costs and prices in the home economy relative to those in the trading partner/competitor countries or there could be a large permanent deterioration in the terms of trade, like the oil shocks. The hike in domestic costs and prices lowers the home country's external competitiveness and thereby generates a trade deficit. The adverse terms of trade directly involve a trade deficit. Both these developments would necessitate a change in the value at which the domestic currency is pegged in order to preserve the external balance of the economy. However, there arises the question whether the change in the value of the peg should be brought about in a large sudden jump as in the 'adjustable peg' of the Bretton Woods system or in small gradual steps in what is called the 'crawling peg'.

A major difficulty with the adjustable peg was that, parity changes under that system used to be unduly delayed. Therefore, the extent of adjustment required grows so large that it would result in major economic, social and political dislocation when the adjustment is eventually undertaken. The 'aura of cataclysm'[21] attached to a large discrete devaluation is illustrated in the study by Cooper (1986) of 23 developing country devaluations[22]. In this respect, the crawling peg offers a more desirable alternative guaranteeing crisis-free exchange rate adjustment.

The idea of a 'crawling peg' was first suggested by Keynes in 1922 as part of the scheme to restore the international gold standard after World War I. Keynes wanted the stabilization of every nation's exchange rate at the prevailing level, but advocated for those currencies which depreciated less than 20 per cent from the pre-war levels, the possibility of a gradual appreciation to their pre-war parities. (See J.M.K., XVII, Ch. 16). The scheme for exchange rate adjustment in small steps rather than in a sudden sizable discrete step was christened the 'crawling peg' by Williamson (1965) and, it received considerable academic attention in late 1960s and early 1970s when the reform of the international monetary system was under active consideration (see Williamson, 1981b, pp. 3 - 30).

It is worth focussing on two versions of the crawling peg. The first is called a 'PPP - guided crawling peg' in which the peg is altered in order to neutralize the inflation differential between the home country and its trading partners/competitiors and the second, a 'real crawl' in which the 'real peg' is altered in order to promote balance of payments adjustment (see Williamson, 1981c, pp xiii-xiv). Although the post-Keynesian proposal of the crawling peg was put forward with a view to facilitating balance of payments adjustment among developed industrial countries, such a regime has been in fact adopted at some time mostly by semi-industrialized developing countries (e.g., Chile, Colombia, Brazil, Korea, Uruguay Argentina, Israel, Peru and Portugal). These countries have been prone to high inflation and crawling pegs have been used by them principally to ward off adverse effects of high inflation on external balance.

It looks attractive and simple to recommend that an LDC generally follow a 'PPP-guided crawling peg' and a 'real crawl' when there is a need to promote balance of payments adjustment. Such a policy is strongly advocated by Williamson . But when should a real crawl start? Should the country wait until a substantial deficit is evidenced in its current account or should it start just when a marginal deficit occurs? Kenen (1975) conducted a simulation study to examine the relative performance of alternative indicators of external balance like reserve changes and deviations of reserve levels from a norm, for guiding a crawling peg and promote balance of payments adjustment. Branson and

Macedo (1982) generalized Kenen's study in an optimun control framework by combining the above two external balance indicators and derived optimal weight for each of them.

The above discussion is on the assumption that the crawling peg is operated on the basis of certain objective rules, namely, inflation differential or some external balance indicators. This is called a 'formula-based crawling peg' and is distinguished from a 'discretionary crawling peg' which is based on administrative decision. (See Williamson, 1981b, p.4). In the latter case, the authorities do not reveal any criteria in advance, but manage the system in an arbitrary fashion. Is there any justification for the provision of discretionary power to the authorities in the management of a crawling peg?

A rule-based crawling peg works well when monetary disturbances dominate the domestic economy. This is clear from our earlier discussion. For example, a higher inflation in the domestic economy than abroad will not be allowed to worsen trade balance since the crawling peg based on a PPP-rule ensure a smooth depreciation of the domestic currency. But such an exchange rate regime is not suited when real disturbances occur. Provided the real disturbances are not permanent[23], a fixed peg is preferable. The rationale of this conclusion is demonstrated formally by Black (1981) and empirically by Genberg (1981). The substantive point emerging from these studies is that, a rule-based crawling peg is not preferable under all circumstances and there is a strong case for operating a 'decision-variant crawling peg'.

However attractive the idea of a crawling basket peg may appear to be, its relevance for highly open LDCs cannot be taken for granted. We saw earlier in Section 3.2, how a flexible exchange rate regime is not feasible for small open

LDCs. The argument could be valid in the case of a managed flexible exchange rate regime too. For example, when the exchange rate is continuously adjusted downwards for a country whose inflation runs above the world level, will it not lead to a vicious circle of inflation - depreciation - inflation? Such a possibility is strong for highly open LDCs with widespread indexation. In our view, the efficacy of a crawling basket peg depends on two factors: firstly, the feedback effect on domestic price of a nominal depreciation, and secondly, the trade balance effect of a real depreciation. Prior to the adoption of a crawling basket system in a specific country, we should make sure that the above effects are favourable in that country.

3.6 Summary and Conclusion

We may sum up the theoretical aspects of the choice as an LDC exchange rate regime: Floating is infeasible in most LDCs, firstly because of the underdeveloped nature of their financial markets and the lack of integration of these markets with world capital markets, secondly because the trade elasticities in some of these countries are not sufficient to satisfy the Marshall-Lerner conditions in the short-run leading to J-curve effects and, finally because of the highly open nature of many of these countries. On the other hand, pegging is desirable in these countries not only due to the predominance of transitory real shocks but also due to the high cost of short-term exchange rate instability in these countries. While pegging is infeasible for developed countries due to high capital mobility, it is workable in LDCs with exchange controls.

In the context of reasonably diversified trade and financial relations, a basket peg with weights based on 'direction of trade' shares would protect the internal balance of LDCs from disturbances caused by fluctuations in exchange rates amongst the world's major currencies. For some countries with highly concentrated trade with a single country although a single-currency peg minimizes the average variability of bilateral rates ("effective variation"), such a policy clashes with the objective of geographical trade diversification. Besides, the fundamental choice between trade and production for the domestic market is influenced by stability of the effective exchange rate and not by stability of any single bilateral rate and hence a basket peg is preferable to a single-currency peg.

A change in the value of the peg is needed when domestic inflation is faster than the inflation in the country's trade partners/competitors lest it should adversely affect the country's external balance. A change in the value of the peg is also necessary, for example, when the economy is shocked by a real disturbance which is permanent in nature. However, a change in the value at which the currency is pegged through the orthodox 'adjustable peg' method is considered undesirable because of its crisis-ridden nature. A 'crawling peg' is suggested as a crisis-free alternative for effecting exchange rate adustments.

A crawling peg directed towards continuously preserving the constancy of the real effective exchange rate and a change in the real effective exchange rate through a 'real crawl' when there is a well-recognised need for promoting payments adjustment are advocated as practical guides to LDC exchange rate policy. However, the efficacy of such a policy depends upon the domestic price effect of a nominal depreciation on the one hand, and the trade balance effect of a real depreciation, on the other. It is also noted that in the face of transitory real shocks, there is a good case for a discretionary crawling peg rather than a rule-based crawling peg.

The synthesis of the various contributions to the theoretical literature on

LDC exchange rate regime has been able to provide a clear guideline as to what the LDCs should really seek from an exchange rate regime. An exchange rate regime determines the day -to-day nominal exchange rate. The regime has to be established once for all with a view to protecting the economy's internal balance from the disturbance of third currency fluctuations. If the exchange rate regime is instituted on this basic consideration, that will not be subject to sudden changes due to factors such as shifts in the value of the dollar and inflation as we saw in Chapter 2. Given an optimal exchange rate regime which is a basket peg for LDCs, the exchange rate policy has to be directed towards preserving external balance. This is carried out at two levels. Firstly, when the domestic rate of infltion differs from that abroad, the value of the peg has to be adjusted to compensate for the inflation differential for fear that it should upset the country's external balance. Secondly, when there emerges a clearly perceived external disequilibrium the value of the peg has to be changed again, this time by more than the inflation differential, to help promote the balance payments adjustment.

Our review of LDC exchange rate practices in Chapter 2 showed that despite the general shift away from single-currency pegs to basket pegs and more flexible arrangements, the single-currency pegs continue to be the most important exchange rate regime of LDCs as a whole. If we count the fixed and flexible[24] single-currency pegs together, they constituted 48 per cent of all LDCs in June 1985. The share rose to 52 per cent in March 1988. The majority of single-currency pegs are dollar pegs which we saw to be unstable, their number decreasing when the dollar appreciates and increasing when the dollar depreciates in a cyclical manner. There are also a fairly constant number of LDCs pegging to the French franc. The existence of a large number of dollar peggers is explained by the predominant role of dollar as a vehicle and invoicing currency.[25] However, it is made clear in the literature that this is no sufficient grounds for pegging solely to the dollar. The French franc pegs were explained in terms of the prevalence of a French franc zone in Africa with a common currency, the CFA franc, for several countries which are convertible into French franc at a fixed rate by the French treasury. Whatever be the other benefits of such an arrangement for the participating countries, the peg with the French franc is also not justified by the theory of LDC exchange rate regimes.

Footnotes: Chapter 3

1. Johnson (1972) is an exception. He stated that for the large number of "small and relatively narrowly specilized" countries, a fixed exchange regime is preferable to flexible regime.
2. However, there is a group of nations in the Western Europe which follow joint float under the European Monetary System which came into operation since 1979.
3. An excellent discussion of the state of the debate on fixed versus flexible exchange rate is given in Johnson (1972). However, it may be noted that the major nations moved to a floating system not out of conviction for the contemporary academic arguments but rather due to the absence of any other viable alternative.
4. Friedman (1953) claimed that the flexible exchange rates would provide insulation from external monetary shocks whereas later writers in the 1960s emphasized the insulation property of the flexible exchange rates with respect to both monetary and real shocks originating abroad. See Artus and Young (1979).
5. There is now an extensive volume of writings examining the performance of floating in comparison with the previous arguments in favour of such a system. See for example, McCulloch (1983), Dunn Jr (1983), I.M.F. (1984b), Obstfeld (1985) and Crockett and Goldstein (1987).
6. The evidence of exchange market inefficiency is provided firstly, by the fact that the forward exchange rate fails to be the best predictor of the future spot rate and secondly, by the identification of "bandwagon effects" in exchange markets. This is based on the Jurgensen Report (1983) quoted in Williamson (1985a).

7. Please recall the previous discussion on the openness criterion.

8. It is also the conclusion of the study by Frenkel and Aizenman (1982) who treated real consumption as the objective function to be stabilized.

9. Details of this process is explained in Chapter 9 with respect to India.

10. If the shift in the terms of trade is permanent, then it necessitates a change in the exchange rate for the simultaneous attainment of internal and external balance. The two oil shocks of 1973-74 and 1979-80 are instances of permanent real shocks.

11. See the survey of these studies for both developed and developing countries in Chapter 8.

12. See Chapter 6 for more details.

13. The concept of the effective exchange rate was initially developed within the I.M.F. in order to measure the impact of sterling devaluations of 1949 and 1967 (Takagi, 1988 p.272). For later development of the concept, see Hirsch and Higgins (1970), Rhomberg (1976) and Maciejewski (1983).

14. We have the earlier case of at least one currency which adopted a form of basket peg during the inter-war floating period namely, the Canadian dollar, whose value was kept mid-way between the value of the U.S. dollar and sterling (see Takagi, op.cit. p.272).

15. It may be noted that Marshall (1987) did envisage the possibility of different nations giving different weightage to gold and silver in the determination of the value of their currencies resembling the present day own-currency basket pegs. This is clear from Marshall's statement, "If we wished the value of the currency to be regulated chiefly by gold we should have only a small bar of silver, if chiefly by silver we should have perhaps fifty or one hundred times as heavy a bar of silver as that of gold. But if we wished the two metals to have about equal influence, we should, taking account of the existing stocks of two metals, probably choose our

silver bar twenty times as heavy as that of gold" (p.204).

16. Please note that the numeraire also has a weight but the fluctuation of the numeraire against itself is zero.

17. It may, however, be noted that a few developed countries (Austria, Finland, Norway and Sweden) have also adopted the basket peg.

18. See further debate on this point between Connolly (1985) and Williamson (1985c).

19. This is discussed in more detail in Chapter 6, Section 6.3.4.

20. This point is further substantiated mathematically by Branson and Katseli (1982), pp. 200-2.

21. This phrase is borrowed from Williamson (1965, p.15)

22. In the context of developed countries with free capital mobility, the adjustable peg would provoke disruptive short-term capital flows precipitating the crisis. Williamson (1985a, p.67) asserts that the practice of large discrete exchange rate change "has nothing to commend it but nostalgia. ... the use of this anticipated practice virtually guarantees repeated exchange crises,.....".

23. If the real shock to the economy is permanent in nature, a real crawl based on external balance indicators would be preferable.

24. Under flexible single currency pegs we include flexible arrangements that are 'adjusted according to a set of indicators' and 'limited flexibility vis-a-vis U.S. dollar'. The former group of countries is also in a way dollar peggers with the peg being adjusted gradually according to a set of indicators.

25. Connolly (1983)'s justification for the continued existence of dollar pegs in Latin American countries as due to the potential jolt to confidence if the historical link with the dollar is broken, is besides the point. This is so because there had been no such problem in the large number of LDCs who abandoned their historical sterling link.

Chapter 4

The Indian Exchange Rate System: A Historical Perspective

4.1 Introduction

In the last chapter we reviewed the theory of alternative exchange rate regimes. But the exchange rate regime in practice could differ from theory due to institutional factors and institutions are in turn a product of history. A proper understanding of the Indian exchange rate regime,therefore, requires the examination of its historical roots. The evolution of India's exchange rate regime in turn has to be viewed in the context of the dominant-dependent relationship between Britain and India from the early 19th century to the first half of the 20th century. What follows in this chapter is an attempt to bring out the historical details of the Indian exchange rate system as it gradually moved away from a pure silver standard of the 19th century to a flexible basket system of the present time.

A chronology of major events in India's exchange rate regime is given in Appendix Table A4.1.

4.2 Establishment of a Silver Standard

According to the New Encyclopaedia Britannica (1985, Vol. 21, p.86), the year 1818 marks a watershed in Indian history with the realization of British supremacy over the subcontinent. That year is significant in the monetary history of India as well because, the British began a currency reform in India in that year by making the silver rupee coin of 180 grains of standard silver ($11/12^{th}$ fineness) as the unlimited legal tender for South India. (Jain, 1933 pp.2-3). The ending of bimetallism in India took place, however, in 1835 when through the Gold and Silver Coinage Act, the silver rupee was declared the sole unlimited legal tender for the whole of British India. Thus India was placed on a pure silver standard in 1835.

In order to understand the implications of a silver standard for India we need to take a look at the contemporary international monetary scene. Britain came to a full gold standard in 1821.[1] In that year Germany and most countries of the East were on a silver standard. France, Italy, Switzerland, Holland and Belgium, together later known as the Latin Union, and also the U.S.A. were on a bimetallic standard. In this international situation, the stability of the exchange value of a currency depended on the stability of the ratio between the prices of gold and silver. This ratio remained more or less the same up to 1871 and, as a result, India enjoyed a stable exchange rate system from 1835 to 1871.

The next two decades or so, i.e. from 1872 to 1894, witnessed a severe slump in the market price of silver in relation to gold. During this period, independent nations of the world one after another demonetized silver in favour of a pure gold standard.[2] This together with the sharp rise in world silver production and stagnant gold production accounted for the historic fall in the price of silver.[3] This resulted in a continuous depreciation of the exchange value of the rupee vis-a-vis sterling and other currencies of major developed countries which by then had moved to a gold standard. Thus from an exchange rate of 2s in 1871 the rupee dropped steadily to 1s 1d in 1894 (Vakil and Muranjan, 1927, p.38).

4.3 Drift to a Gold Exchange Standard

The sharp depreciation of the rupee which was extended over a long period harmed the economy in general[4] and put severe strain on public finance, the latter arising from the need to make large payments by the Indian government to Britain in sterling. (J.M.K., I, pp.1-2). Belatedly, in response to the Herschell Committee (1892) recommendations, the Government of India closed the mints for silver on private account in 1893 and fixed the value of the rupee at 1s 4d. With sterling on gold standard, this implied a fixed gold value for the rupee. This official gold value for the rupee being higher than the bullion value meant that the rupee was to become a token coin thereafter with its monetary value divorced from its intrinsic value. However it took almost another five years for the shortage of rupees created by the stoppage of silver coinage to raise the rupee value to the official rate. In January 1898 the exchange value of rupee touched 1s 4d.

After the rupee hit its official rate, the Government of India took a number of steps with a view to stablilizing the rupee at that level which led to the establishment of what is called a gold exchange standard in India. The Indian gold exchange standard differed from the pure gold standard essentially in two regards. Firstly, unlike the latter the former did not admit convertibility of the domestic currency into gold but instead, allowed for convertibility into sterling which in turn was convertible into gold. [5] Secondly, the gold exchange standard did not have local gold coins circulating as a means of payment.

As emphasized by Keynes (J.M.K., I, Ch.1) the introduction of the gold exchange standard in India was not the result of any deliberate design on the part of neither the Indian nor British government, but India drifted into such a system through a number of administrative rather than legislative measures taken since 1898 whose implications were not well perceived at that time. Keynes was fascinated by the Indian system and praised it in his first book, Indian Currency and Finance written in 1913. He noted that the Indian system contained an essential ingredient of the future ideal currency, namely, "the use of a cheap local currency artificially maintained at par with the international currency or standard of value" (J.M.K., op. cit. p.25). Later in giving evidence to the Royal Commission on Indian Currency and Finance (Hilton Young Commission, 1926) Keynes stated that the pre-war gold exchange standard functioning in India was perhaps "the best currency system then existing in the world" (J.M.K., XIX, p.521). Keynes also said that though India was not the first country to introduce a gold exchange standard,[6] she was the first to adopt it in its complete form and after the system was perfected in India, it was soon widely copied in Asia and elsewhere[7] (J.M.K., I, pp.23-5).

It would not be out of place here to mention about the stabilizing role the Indian exchange standard played in the pre-World War I international monetary system centred on Britain. This is brought out clearly by De Cecco (1984, Chs. 2 and 4). During this period India had a large trade surplus with the rest of the world but a continuous trade deficit with Britain. Britain's trade surplus with India enabled the former to settle her trade deficit with the rest of the world which remained high with the loss of Britain's competitive advantage to others, particularly the U.S. and Germany. Besides, under the gold exhange standard India kept a large part of her exchange reserves in London in the form of sterling securities and deposits which "provided a large *masse de manoeuvre*" for the Bank of England. (De Cecco, op. cit. p.62).

4.4 Breakdown of the Gold Exchange Standard

The pre-war system was generally trouble free. The exact details of the working of the system is not central to our purpose. However, one should note that the strength of the system was derived from the willingness and ability of the government to issue rupees in exchange for gold or sterling and sterling in exchange for rupees at 1s 4d per rupee. The rupee being a token coin, the former condition required that the bullion value of the silver rupee should not be higher than its face value. The trouble started when there occurred a sudden rise in the gold price of silver. It more than doubled from about 27d per ounce in 1915 to 55d in 1917.[8] By August 1917 the worst happened; the bullion value of silver rupee exceeded its face value. Thereafter the government could have issued fresh coins only at a loss. The silver price was still rising and, as a result, value of the rupee had to be adjusted upwards depending on the gold price of silver. Thus the gold exchange standard collapsed and in effect India was back again on a silver standard.

The Babington Smith Committee (1920) set up to review the Indian currency and exchange situation, wanted India to be placed once again on a gold standard at a time when the pound itself was floating downward against gold.[9] The only way to bring the rupee to a gold basis, the Committee thought, in the context of the rising value of silver, was to raise the exchange value of the rupee to a high 2s gold [10] (which was higher than the rate prevalent at the time of the submission of the report) i.e., a 50 per cent rise in the parity of the rupee from the pre-war level of 7.5334 grains of gold to 11.30016 grains. In arriving at this rate, the Committee was greatly influenced by Keynes who appeared before the Committee as a witness. Keynes' argument for a higher value for the rupee was, however, independent of the high value of silver, which is rather a technical matter as we saw earlier. He was concerned, on the other hand, about the high and rising world inflation spreading into India which had a lower inflation than the rest of the world that time. In order to insulate the Indian economy from the high comparative inflation abroad high exchange rate was advocated by Keynes. [11] (See J.M.K., XV, Ch.5)

The government announced its decision in February 1920 to establish the high gold parity for the rupee as recommended by the Babington Smith

Committee. However, it appeared soon that, the attempt to drive the rupee to 2d was bound to fail on account of two factors: first, India's balance of trade deteriorated considerably which reduced the demand for rupees and second, the factor which kept the value of the rupee rising earlier, i.e., the rising silver prices, disappeared and there began a fast decline in silver prices after December 1919. The government spent about £55 million in supporting the exchange value of rupee in the first nine months of 1920. Besides, the government sold nearly 20 million tolas of gold from February to September 1920 to the public in order to maintain the exchange rate at 2s gold against the rupee. By the end of September 1920 the Government of India gave up its attempts to defend the value of the rupee. The rupee dropped steadily thereafter to 1s 3d sterling in March 1921 and remained that low for some time. (See Vakil and Muranjan, op. cit. pp.123-9).

4.5 Return to Gold Standard

The value of the rupee recovered in early 1923 to 1s 4d sterling. This had been due to an improvement in the trade balance during 1922-23 and also due to the government policy of fiscal and monetary contraction during 1920-23. (Vakil and Muranjan, op. cit. Ch.19). The policy of tight money continued in spite of the improvement in trade balance and the exchange rate rose to 1s 6d sterling (1s 4d gold) in October 1924. In April 1925 Britain re-established the gold standard at pre-war parity.[12] But the rupee was maintained at 1s 6d which meant that the Indian currency was placed above the pre-war gold parity (1s 4d). Thus the gold parity of rupee became 8.47512 grains of gold against the pre-war level of 7.5334 grains, i.e. an apreciation of 12.5 per cent.

The Hilton Young Commission (1926) set up to study the latest Indian monetary and exchange situation and make recommendations, suggested a gold bullion standard for India similar to the one esablished in Britain in April 1925. Under this system, gold was not to circulate as currency but the currency authority would be bound to buy and sell gold without limit in quantities of not less than 400 fine ounces at rates based on the gold parity of the rupee. The gold parity recommended was 1s 6d which was the one prevailing at that time.[13] The Commission's recommendations were enacted in March 1927 with one major amendment, namely, instead of the unlimited purchase and sale of 'gold' against the rupee as proposed by the Commission, the legislation provided for 'gold or sterling' at the discretion of the government. This change made the new exchange rate system introduced in India more or less a gold exchange standard of the early 1898-1916 period. One could, however, find one difference between the two: the new one had a statutory basis whereas the old one was based on mere executive practice. (Jain op. cit. p.35).

4.6 Rupee and the Sterling Area

Britain abandoned the gold standard in September 1931 and sterling began to depreciate heavily against the dollar. However, many of Britain's principal commercial partners pegged their currencies with sterling.[14] This group of countries who maintained a fixed link between their currencies and sterling following the suspension of the gold standard by Britain, together with Britain came to be known as the 'sterling bloc'. As the pound floated, the Indian rupee was legally tied to the sterling by the government ordinance of September 24, 1931 at the then prevailing rate (1s 6d).

By the beginning of the 1930s Britain's relation with the internatioal economy underwent a fundamental transformation (Cairncross and Eichengreen, 1983, p.11). Following the suspension of the gold standard the U.K. introduced trade and exchange controls.[15] However, under the 'Imperial Preference' agreed at the Ottawa Economic Conference in 1932, empire products were exempted from British trade restrictions. Similarly, British capital controls were also made generally inapplicable against the Commonwealth countries from 1933.

The year 1931 is an important landmark in the evolution of India's exchange rate system. At the international level, that year marked the end of a multilateral settlement system which prevailed throughout the 19th century and the early 20th century and the emergence of regional clearing systems based on different currency blocs. India became part of a large currency bloc which was to shape her trade and financial relations for a number of decades to come. The rupee became formally and firmly on a sterling peg with no link whatsoever with any metallic commodity, either direct or indirect.

The management of the rupee at 1s 6d was, however, not easy. Ever since the rupee touched that rate in October 1924, the government's determination to keep that rate stable involved substantial currency contraction. The policy of monetary contraction continued after the implementation of the Hilton Young Commission's recommendations.[16] The situation became critical in the beginning of the financial year 1931-32 due to the unprecedented fall in the international prices of agricultural products and hence the collapse of Indian exports as global recession deepened.[17] The exchange rate dropped to the lower gold point and the government had to unload nearly £11 million to maintain the value of the rupee at the lower point between August and mid-September 1931. (Jain op. cit. p.40). Following the change over to the sterling standard the prime consideration was to preserve the sterling value of the rupee. Towards that end, exchange control was introduced in the form of refusal of sale of foreign exchange for purposes other than normal trade and other prescribed items.[18]

India ran a substantial trade deficit during the 1930s. This period also witnessed a massive and prolonged outflow of gold from India which became controversial in the context of India's notoriously insatiable appetite for foreign gold.[19] The huge outflow of gold might have greatly helped the stabilization of the rupee at the official rate vis-a-vis sterling in spite of the heavy trade deficits. (Conan, 1952, pp.89-90).

Although there was strong public criticism[20] of the new exchange rate arrangement, the system served India rather well during a very difficult period. The immediate effect of the fixed sterling link was the partial insulation from world slump in primary commodity prices stemming from the fact that the U.K. was relatively less affected than other leading countries during the great depression (Nurkse, 1944, p.49). This was reflected in the rapid rise of the share of U.K. in Indian exports from 23 per cent in 1930-31 to 35 per cent in 1940-41 (The Cambridge Economic History of India, Vol. 2, 1983, pp.864-5). Being a member of the sterling bloc India benefited from the free U.K. market and probably also from the free long-term capital flows from the U.K.

World War II brought significant changes in the sterling bloc both in membership and in nature. The European nations except Ireland and Iceland broke away just before or immediately after the outbreak of war. The organisation became a formal and coherent entity with the introduction of an exchange control system not just in the U.K. as before, but in the entire group, against the rest of the world with virtually no payments restrictions among the members of the association.

The phrase 'sterling area' came to be used only during the war. The principal aspect that differentiates the post-1939 sterling area from the previous sterling bloc is the emergence of the so called 'dollar problem'[21] which compelled the U.K. to institute rigid exchange controls around the sterling area as a whole (Day, 1954, pp.45-47) and to set up the central dollar pool. Under the dollar pool arrangement, the members were to curb the potential loss of dollar reserves by imposing licensing restrictions on 'dollar imports' and to surrender their additional earnings of gold and dollar to the Bank of England.

To India, like any other sterling bloc country of the time, however, dollar pooling during World War II did not represent something new. These countries used to keep most of their reserves as sterling balances in London by converting the earnings of all other foreign reserves. The difference, however, had been the imposition of exchange control and import restrictions for the purpose of ensuring and enhancing the central dollar and gold reserves of the sterling area.[22] Those regulations came to be operated in India under the Defence of India Rules formulated in September 1939.

A major development during the 1930s in India was the setting up of a central bank under the Reserve Bank of India Act, 1935. Thereafter, the function of maintaining the exchange value of the rupee passed from the government to the central bank, namely, the Reserve Bank of India. The Reserve Bank was obliged to buy and sell sterling for rupees on demand without limit at fixed rates so as to keep the rupee-sterling parity at 1s 6d. The Bank also assumed the authority for administering the exchange control since 1939.

During World War II the maintenance of the exchange value of the rupee at 1s 6d could have been easy. India acquired a substantial surplus on ~~a~~ current account partly due to a favourable balance of trade and partly due to the heavy war expenditure by the Allies in India (Conan, op. cit. pp.31-2). India virtually eliminated her external public debt during the war which had stood at about £300 million at the beginning of the war. More importantly, India's sterling balances at the end of the war came to £1.3 billion which constituted 35 per cent of the total sterling liabilities of the U.K. and 52 per cent of the sterling holdings of the overseas sterling ara. (See Bell, 1956, Table 1, p.22).

4.7 Rupee and the Post-World War II Bretton Woods System

The end of World War II did not lead to the dismantlement of the sterling area. In India, the exchange control regulations, which became operative since 1939 based on emergency powers under the Defence of India Rules, were in fact placed under the statute through the enactment of the Foreign Exchange Regulation Act in March 1947. Further developments in the exchange rate regime of India under the Bretton Woods par value system are examined under different sub-heads below.

4.7.1 Rupee's Initial Par Value in the Bretton Woods System

The establishment of the Bretton Woods sytem at the close of the war in 1944 in which India was a founder member, logically implied that India should break her ties with the sterling area. This is so because, the sterling area with exchange controls operating around it, was definitely incompatible with the IMF objective of "the establishment of a multi-lateral system of payments in respect of current transactions between members and .... the elimination of foreign exchange restrictions which hamper growth of world trade" [Article 1 (iv) of the IMF]. Nevertheless, the immediate post-war period did not involve any significant change in the working of the sterling area arrngement [23] and, India's continued membership in that association in turn meant no substantial change in her exchange rate arrangement.

Under the Articles of the Fund, the members were to intimate their respective exchange rates in terms of either gold or the U.S. dollar. India complied with that provision in December 1946 by declaring the value of the rupee in terms of gold (i.e., 4.145142857 grains of fine gold) but the par value was so fixed as not to disturb the rupee's then prevailing parity with sterling of 1s 6d (i.e., £1 = Rs.13.33). Following the communication of the par value of the rupee to the Fund, the Reserve Bank of India Act was amended in April 1947 extending the power of the Bank to buy and sell 'foreign exchange' instead of just 'pound sterling'. However, in practice the Bank dealt in only the pound sterling (RBI, 1983, p.284). In short, the immediate post-war period saw India adopting the Bretton Woods par value system only *de jure* as her exchange rate system remained on a *de facto* sterling peg.

4.7.2 Impact of Pound Devaluation, 1949

The U.K. devalued sterling by 30.5 per cent against the U.S. dollar in September 1949 (i.e., from \$4.03 to \$2.80). The question then arose as to whether India should follow suit. Ultimately it was decided to maintain the parity with sterling by devaluing the rupee against the dollar by an identical extent. This decision to follow sterling was dictated by the fact that India's trade was concentrated in sterling area countries and, therefore, was a defensive step. The Prime Minister of India made that clear in his broadcast to the nation after the devaluation:

> "The sterling area is important to us in our international economic relations. A great part of our international trade is with this area; most of our export markets are also in this area, ... If we have not taken parallel action in revising the dollar-rupee ratio, the prices of our goods in our principal export countries would have risen immediately and that would have affected our trade interests .... The devaluation of the pound therefore made the revision of the dollar-rupee rate almost unavoidable in the interests of our own country" [24]

4.7.3 Impact of Sterling Convertibility

It is well known that although the establishment of the IMF has been the most significant world monetary development after World War II, the IMF suffered a temporary eclipse soon after it was set up mainly due to the after-effects of the economic devastation of Europe during the war. It was only in December 1958 with the simultaneous announcement of currency convertibility by all major West European countries that the Fund objective of a unified multi-lateral settlement system came to be realized.[25] With the adoption of total current account convertibility by the major European nations including the U.K. in February 1961,[26] the sterling area dollar pool arrangement ceased to exist i.e., the members the sterling area from then onwards did not need to discriminate against goods and services from the rest of the world.

By the beginning of the 1960s, with the restoration of total convertibility of sterling, the sterling area became an informal and voluntary association as far as the independent countries of the area were concerned. In India that gave a big push to the drive for diversification of transactions away from the U.K. and the rest of the sterling area, a drive which at first started after the 1949 sterling devaluation (particularly with regard to India's exports). This can be seen from Table 4.1.

Table 4.1 indicates that the share of India's current spending (imports plus invisible payments) in the sterling area declined substantially from nearly a half of the total in the mid-fifties to just under a fifth by the end of the sixties. Similarly, the share of India's current receipts (exports plus invisible receipts) from the region declined by more than half from 54 per cent of the total to 26

Table 4.1 Share of Sterling Area in India's Current Transactions for Selected Years (1951-71)

Year (April-March)	Current Payments	Current Receipts
1951-52	41.1	59.3
1955-56	49.4	53.9
1960-61	34.2	46.4
1965-66	21.6	34.4
1970-71	18.2	26.2

Source: Worked out from various issues of Reserve Bank of India Bulletin, Bombay

per cent over the same 15-year period. That the share of current payments to the sterling area shrunk faster than that of current receipts from the area reflects the intensity of the trade and exchange controls erected against the non-sterling world during the earlier period up to the mid-fifties.

Although we noted a shift in India's external transactions from the mid-fifties toward the non-sterling area countries, this was not to have any impact on the country's exchange rate regime which was centred on sterling. Sterling continued to be the intervention currency of the system, the authorities kept parity with sterling and kept the bulk of foreign balances in sterling. This situation would have continued but for two developments: first, the deterioration of India's balance of payments and second, the devaluation of the pound. The impact of these events on India's exchange rate system is examined below.

4.7.4 Rupee Devaluation in 1966

India'a balance of payments which remained in difficulty throughout the decade after the mid-1950s,[27] became critical by early 1966-67. The government had been taking a number of measures in the form of export subsidies, import restrictions and incentives for foreign remittance. They all proved inadequate and, with the situation worsening, the government took the radical decision of devaluing the rupee by 36.5 per cent on June 6, 1966.

As reported in IMF History (1976, Vol. I, p.468), the 1966 devaluation of the rupee was a unilateral step which is unusual within a major currency area. This was also the first significant exchange rate policy decision taken by the independent government.[28] In this context, it is interesting to note that in a pamphlet issued to the public shortly after the devaluation, the government quoted the pre-independent incident of fixing a high value for the rupee in 1927 against the plea for a lower rate by the Indian public opinion.[29] The rupee devaluation of 1966 was presented by the government as an assertion of national autonomy.

Strangely enough, the 1966 devaluation also became controversial mainly because it was generally believed to be the result of pressures from the Aid-India Consortium under the auspices of the World Bank.[30] Moreover, the devaluation could not produce any perceptible increase in exports although some of the major non-traditional non-agricultural exports did seem to have responded to the devaluation (see Bhagwati and Srinivasan, 1975, Ch.9). This was partly due to a second massive drought following the devaluation affecting the exportable surplus , and partly also due to the loss of competitiveness suffered on account of the domestic price rises also triggered off by the drought. Anyhow, the experience was to leave a lasting impression on the government which might have had a large influence on its decisions relating to exchange rate policy in the subsequent period (see Joshi and Little, 1987).

4.7.5 1967 Sterling Devaluation and the End of the Sterling Area

The pound sterling was devalued from $2.80 to $2.40 (14.3 per cent) in November 1967. This time, unlike in 1949, only a limited number of countries in the sterling area kept parity with sterling intact by devaluing with sterling. India, like majority of sterling area countries, did not devalue with sterling. By reducing overnight the dollar value of foreign balances of several countries, the 1967 sterling devaluation gave a significant jolt to the sterling area.[31] It induced the sterling area countries including India to speed up the diversification of their foreign exchange reserves to currencies other than sterling.

The trend became particularly marked in the second quarter of 1968 when the officially held sterling holdings of the overseas stering area declined by £230 million (British Parliamentary Papers, 1968, p.4). Fearing that such massive liquidation of reserves would aggravate Britain's balance of payments difficulties, the British Government guaranteed to maintain the dollar value of a large proportion of sterling balances with these countries in return for keeping a minimum portion of their reserves in sterling. These agreements, which revived the spirit of formality within the sterling area once again, were initially for three or five years depending on the country, starting from September 1968 but extended a few times up to December 1974.

The step which marked the beginning of the end of the stering area was taken by the U.K. in June 1972 along with her decision to float the pound, namely, the extension of exchange control on long-term capital flows to most of the sterling area. (See Tew, 1985, pp.79-80). This prompted a large majority of countries in the sterling area to go off the sterling peg and also to reduce sharply the share of sterling in their total reserve holdings. This together with Britain's joining the European Economic Community in January 1973, signalled the death knell of the sterling area.

The U.K. abolished all the remaining exchange controls in 1979 and with that the sterling area officially ceased to exist. As far as India is concerned, the process of diversification of international reserves accelerated particularly from 1975 with the expiry of the exchange rate guarantee agreement in December 1974. By the end of the 1970s and begining of the 1980s the pound sterling constituted "only a modest portion" of India's official reserve holdings.[32] (Reserve Bank of India, 1983, pp.288-9).

4.8 The Rupee and the Dollar

As the importance of the pound in India's external transactions has been waning since the early 1950s,that of the dollar has been waxing. As expected, the growing importance of the dollar in India's external transactions has been reflected much more in India's current payments rather than current receipts as it was the former which had been constrained by the earlier operation of trade and exchange controls under the sterling area arrangement. Thus the share of India's imports from the U.S.A. increased rapidly from 13 per cent in 1953-54 to as high as 38 per cent in 1965-66, whereas that of India's exports to the U.S.A. moved up only marginally from 17 per cent to 18 per cent during the same period.[33] On the investment side, the U.S. share of private investment in India grew from 8 per cent in December 1953 to 22 per cent in March 1965 whereas the British share declined from 83 per cent to 54 per cent during the same period.[34] However,the importance of the dollar for India is not confined to her transactions with the U.S. alone. The U.S. dollar acquired the status of an international currency particularly after the removal of restrictions on all current account transactions by the West European Nations and Japan in the early 1960s. As a result, the bulk of India's growing trade with Japan[35] and developing countries has been invoiced in the U.S. dollar.

The replacement of sterling by the U.S. dollar in India's external transactions was expected to have its impact on India's exchange rate system which was for long been based on maintaining parity with sterling. The 1966 devaluation which broke parity with sterling with a bang, however, is explained largely by India's balance of payments adjustment need and it was a devaluation agianst all currencies, not just against sterling. The reluctance in 1967 to devalue with the pound is only a partial recogition to the reduced relevance of sterling for India as it is explained more by the rupee's own earlier devaluation. However, in 1971 after the suspension of official dollar-gold convertibility by the U.S. in August and the floating of major currencies which followed it, the Indian authorities opted for keeping parity with the dollar. In August 22, 1971 India introduced a dollar peg for the rupee and this development is significant. It could have been interpreted as the first official recognition of the reality of the predominance of the U.S. dollar in India's external transactions. But, as we shall see later, this official act turned out to be quite different, and did not in any way represent the beginning of a consistent policy giving larger importance to the dollar in India's exchange rate system.

Even when India adopted a dollar peg in August 1971, sterling was retained as the currency of intervention. This meant that while India maintained the rupee-dollar rate at the level that existed since the 1966 devaluation, i.e., $1 = Rs 7.50, the Reserve Bank of India would announce daily the buying and selling rate for the pound sterling based on the dollar-sterling rate prevailing in the

London market. Thus, the Bank would not buy and sell the dollar to stabilize the rupee-dollar rate but would perform that function indirectly through the traditional medium of sterling. For example, if there was a depreciation of the pound against the dollar in the international market, the Reserve Bank would reduce the buying and selling rates of the pound against the rupee by the exact extent of depreciation of the pound against the dollar. This would maintain the value of the rupee in terms of the dollar in India constant. There was no official statement on the rationale of this indirect dollar peg. As we mentioned earlier, the Reserve Bank of India Act as amended in April 1947 after India became a member of the Fund, did give the Bank power to intervene through any foreign currency not just sterling. The reason why the Bank did not intervene through the dollar after a switch to the dollar peg could be firstly, that the Bank wanted to proceed very slowly in an uncertain international monetary situation and secondly, that the Bank introduced the dollar peg only as a temporary expedient. This is explained below.

The conjuncture about the temporary expediency of the dollar peg can be understood this way. The effect of 1966 rupee devaluation was largely nullified by high prices resulting from a second massive drought and also, to some extent, by the pound devaluation in 1967. The Indian balance of payments continued to deteriorate and it might have been thought by the authorities to require another exchange rate adjustment. But the bitter political controversy that was generated by the 1966 devaluation ruled out another open devaluation. However, it was known that the dollar was greatly overvalued and, therefore, would depreciate against other major currencies when those currencies were floated against it. Therefore, the Indian authorities might have seen this as an opportunity to bring about a gradual devaluation of the rupee by linking its value with the weak dollar and this, in effect, was the result. Prior to the

Smithsonian realignment of major currencies in December 1971, the rupee depreciated 5.1 per cent against the pound and by similar amounts against other major currencies depending on the rate of depreciation of the dollar against them.

4.9 Rupee Back to Sterling

The Smithsonian realignment of major currencies did not signify a return to the Bretton Woods par value system and the official convertibility of gold into dollar was not restored. Instead, the agreement ushered in a temporary regime of "central rates and wider margins" (IMF History, Vol. I, 1976, pp.557-66). India adopted a central rate for the rupee against the pound sterling based on the rupee-sterling rate which prevailed on the eve of the realignment, i.e., £1 = Rs 18.9677, and was to avail herself of wider margins of 2.25 per cent above and below the central rate, instead of the plus and minus one per cent margins in the Bretton Woods par value system.

The December 1971 arrangements meant a comeback to the sterling peg, although with broader margins, after a brief spell (August 22 to December 19, 1971) of the dollar peg. This relink with sterling was confirmed later in June 1972 when the pound was floated consequent upon the worsening balance of payments situation in the U.K. The rupee followed sterling as the latter was floated, recalling the events of 1931.

In the absence of any official explanation for this switch in policy, some plausible interpreations have been put forward by earlier authors. Joshi and Little (op. cit. p.377), for example, provide a politico-economic explanation. India was involved in a war with Pakistan over Bangladesh in late 1971 which severely strained India's relations with the U.S.A. and also led to the suspension of U.S. aid to India. The quick reversal of the dollar peg almost at the same time could have been a fall-out from the worsening of the Indo-U.S. relations. The economic interpreation is similar to the one given above by the present author for the earlier move towards the dollar peg. That is, the Indian officials would have cleverly anticipated the future weakness of sterling with a view to effecting yet another backdoor devaluation on the back of sterling.[36]

One could also add another interpretation which emphasizes the role of inertia on the part of the Indian monetary authorities. The dollar peg of four months might have stretched the available expertise within the Bank in dealing with a floating pound rate for the rupee which the Bank had not experienced at all ever since its inception in 1935. That could perhaps explain the immediate suspension of forward dealings by the Bank in pound sterling which lasted over a week. The reversion to the well-accustomed stering peg would mean no change in the time-old practice of operation in foreign exchange market by the Bank. It avoided the problem of continuous decision-making that would be necessary if the pound-rupee rate were to undergo change every day.

However, the Reserve Bank, after the swing back to the sterling peg, tried to moderate the impact on the rupee of the heavy depreciation of the pound immediately after it was floated on June 23, 1972 by revaluing the rupee first on June 26, 1972 and second on July 4, 1972 both adding to 0.9 per cent. After those adjustments, there were no further rupee-sterling rate changes for the next three years in spite of the continuing depreciation of the pound against other major currencies. The effective exchange rate of sterling declined by 22 per cent during June 1972 - June 1975.[37] As a result, the rupee also depreciated heavily against other major currencies: 10 per cent against the dollar, 13 per cent against the yen, 34 per cent against the deutsche mark and 18 per cent against the French franc during June 1972 - June 1975 (Table 4.2).

Table 4.2 Rupee's Exchange Rate against Selected Currencies, 1972-75 (Rupees per Foreign Currency)[a]

Month	Dollar	Yen	Deutsche Mark	French Franc	Pound Sterling
June 1972	7.363	0.0242	2.322	1.469	18.967
June 1973	7.363	0.0278	2.855	1.732	18.967
June 1974	7.937	0.0280	3.142	1.619	18.969
June 1975	8.190	0.0279	3.499	2.045	18.694
July 1975	8.489	0.0287	3.442	2.009	18.547
August 1975	8.795	0.0295	3.414	2.010	18.596
Sept. 1975	8.865	0.0296	3.389	1.983	18.496

a. Period averages of daily rates

Source: Rupee-dollar rates are from the IFS, IMF. Other bilateral rates are computed from those rupee-dollar rates and the respective dollar rates of other currencies also given in IFS.

A recognition on the part of the authorities that the rupee had gone down far enough was indicated by their decision on July 2, 1975 to revalue the rupee against sterling from £1 = Rs 18.80 to £1 = Rs. 18.60, i.e. by 1.1 per cent. The authorities did not make any further adjustment in the rupee-pound rate in the next three months despite the accelerated depreciation of the rupee against the dollar and the yen in that period; the rupee depreciated by another 8 per cent against the dollar and 6 per cent against the yen during July-September 1975 (see Table 4.2). Perhaps the authorities did not want to violate the IMF scheme of "central rates and wider margins" in which the maximum margins from the central rate established in December 1971 was only ± 2.25 per cent.[38]

4.10 Effect of Sterling Peg, 1972-75

We saw above that the authorities' policy of a sterling peg during 1972-75 resulted in large depreciation of the rupee against major currencies other than sterling. Did the rupee depreciation positively help in boosting India's exports during the period?

The Indian economy was passing through a very difficult time during 1971-72 to 1974-75. The trouble started even before the first oil shock with two consecutive bad harvests in 1971-72 and 1972-73 which were followed by an industrial recession in 1973-74 (See Table 4.3). This generated high inflation in the economy. The index of wholesale prices rose by 10 per cent in 1972-73. The next year the price index moved up by 20 per cent which was partly due to the impact of the first oil shock. Matters turned worse in 1974-75 with another bad crop and the index of wholeprice prices shot up by 25 per cent that year. In the context of this highly troubled domestic situation, it may be too optimistic to hope that exports would receive a big boost with a favourable exchange rate outcome.

Table 4.3 Selected Economic Indicators of Indian Economy during 1971-72 to 1975-76 (Annual Growth Rates)

Period (April-March)	Real GDP	Agricultural production	Industrial production	Wholesale prices
1971-72	1.6	-0.3	5.7	5.6
1972-73	-1.1	-8.1	4.0	10.0
1973-74	4.7	10.0	0.8	20.2
1974-75	0.9	-3.2	3.2	25.2
1975-76	9.4	14.9	7.2	-1.1

Source: 1. National Accounts Statistics, C.S.O., Government of India
2. Economic Survey, Government of India

Nevertheless, the volume of India 's exports recorded a remarkable growth: it grew by an annual rate of 8 per cent during 1971-72 to 1975-76 (Table 4.4).

Table 4.4 Volume, Price and Value of India's Exports during 1971-72 to 1975-76

Period (April-March)	Exports		
	Volume[a]	Price[a]	Value (Rs. crores)
1971-72	107	108	1608
1972-73	120	120	1971
1973-74	125	146	2523
1974-75	133	183	3329
1975-76	147	197	4036

a. Base: 1968-69 = 100

Source: Economic Survey, Government of India

However, the role of the exchange rate in this export performance is not clear as a number of other favourable factors were in operation during this period. The hike in oil prices created boom conditions in the Gulf and the share of India 's exports to OPEC nations rose sharply from 5 per cent in 1973-74 to 15 per cent in 1975-76. There were substantial exports to Bangladesh from India in this period which were financed by aid from India. There was a marked rise in sugar prices abroad which raised the quantum of India's sugar exports nearly five times from 1973-74 to 1975-76 mainly through destocking. Another factor was the strict monetary and fiscal discipline administered by the government to tackle the inflationary situation during the period. Curbing domestic demand pressures might have released larger surpluses for exports (Ahluwalia, 1986, pp.941-2).

The above discussion does not, however, imply that the depreciation of the rupee during 1972-75 arising from the sterling peg did not serve any useful purpose in relation to India's exports. Table 4.5 gives the trends in rupee's nominal and real effective exchange rate indices from 1971 to 1975. It shows that the rupee's nominal effective exchange rate depreciated by about 20 per

Table 4.5 Nominal and Real Effective Exchange Rate of the Rupee during 1971-75[a]

Year	Nominal Effective Exchange Rate	Real Effective Exchange Rate
1971	98.5	100.2
1972	91.7	98.0
1973	83.8	93.3
1974	81.9	96.1
1975	78.6	88.9

a. Base: 1970 = 100

Source: 11-country export-weighted index computed by the author. Methodology of construction of the index is explained in Chapter 7.

cent during the four-year period, whereas the depreciation in real effective exchange rate, i.e., nominal effectve exchange rate adjusted for the relative inflation at home and abroad, was a lower 11 per cent. Therefore, the large nominal depreciation of the rupee during the sterling peg helped in improving the competitive position of India's exports in spite of the relatively higher inflation in India than abroad. It appears reasonable to suggest, therefore, that but for the large depreciation of the rupee India's exports would not have fared as well as it did during the period of the sterling peg.

4.11 Shift to a Multi-currency Peg

Although the sterling peg had been beneficial, it could at best be a transitional arrangement applicable during a period of considerable uncertainty at home and abroad. On 25 September 1975, the Indian authorities snapped the rupee-sterling link and introduced a basket peg by which the future value of the rupee was to be determined on the basis of the average value of a selected number of currencies of India 's major trading partners. The rationale behind this decision has been exchange rate stability which is clear from the statement given in the government's Economic Survey for 1975-76 presented to Parliament in February 1976. It said:

> "... in order to impart greater stability to the effective exchange rate in a world where the major currencies are floating and in the wake of the continuing depreciation in the exchange value of the pound in recent months, a new arrangement was instituted whereby the exchange value of the rupee is changed periodically with reference to a suitable weighted average of the exchange rate movements of the currencies of India's major trading partners." (p. 41)

It would be worthwhile to examine the conditions of the Indian economy which made the stability of rupee's effective exchange rate very important at the time of the introduction of the basket system. The inflationary situation in the country had eased from the second half of 1974-75 and the index of wholesale prices registered a decline in the second quarter of 1975-76 as compared to the previous year. The agricultural situation changed with signs of an exceptional harvest in 1975-76. There were also indications that industrial production was picking up fast. On the external front, however, the situation was still worrying with import prices still continuing to rise faster than export prices resulting in further deterioration of India's terms of trade (See Table 4.6). In this situation, there were fears that increasing import prices particularly of oil, fertilizers and food (the share of these three combined in India's total import bill rose from 25 per cent in 1972-73 to 55 per cent in 1974-75) may rekindle inflation which had just been brought under control. The rupee's

Table 4.6 Indices of Unit Value of Exports and Imports. 1971-72 to 1975-76[a]

Period (April-March)	Exports	Imports	Net Terms of Trade [(2/3x100)]
(1)	(2)	(3)	(4)
1971-72	108	93	116
1972-73	120	97	124
1973-74	146	138	106
1974-75	183	239	77
1975-76	197	280	70

a. Base: 1968-69 = 100

Source: Economic Survey, Govt. of India

continuing link with the pound with no let up in the downward pressure on the pound in foreign exchange markets, might have been considered an aggravating factor in this regard. That the moderation of the effect of imported inflation was a consideration behind the adoption of the basket peg is implied in the Annual Report of the Reserve Bank of India, 1975-76, which stated:

> "The effect of this change (from the sterling peg to the basket peg) has been to stabilize the value of the Indian rupee vis-a-vis currencies other than sterling and to increase the purchasing power of the rupee in terms of sterling. This has contributed to some extent to the stabilization of prices, by preventing an increase in the prices of imported commodities and services." (p. 4)

There were suggestions within the country during the sterling peg that the rupee should be floated for some time to find its own value. (See Taneja, 1976, pp.204-5 and pp.428-9). The floating of the rupee was particularly advocated as a possible solution to the problem of black markets in foreign exchange which had reached high proportions since the beginning of the 1960s (Nandi, 1985).

For example, B.R. Shenoy in October 1973 wanted a unification of the official and black markets for foreign exchange in India through an initial floating of the rupee. In July 1974, I.G. Patel recommended a controlled float of the rupee as necessary to make the rupee respond to the needs of the economy and also to develop expertise within the Reserve Bank and commercial banks to operate within a system of flexible exchange rates that had come to prevail in the international markets.

However, these ideas were, in fact, premature for a country like India without the minimum institutional back-up necessary for a reasonably satisfactory operation of a floating exchange rate system. As made clear in last chapter, floating presupposes the existence of a well-knit domestic financial market which is also integrated with international financial markets with large freedom of movement of capital flows externally. Free capital mobility in turn implies the virtual absence of any trade and exchange controls. India at this stage of her development could hardly afford the scrapping of all controls on trade and capital flows. This was the basis on which the government rejected the proposal of a floating exchange rate system for India (Taneja, op. cit. p.208).

There were also a number of developments at the international level which could have partly influenced India's decision for a switch to a basket system in September 1975. From early 1973, developing countries were gradually shifting from single currency pegs to multi-currency pegs. In March 1973, Malta formally announced that the value of her currency would be determined by a basket of currencies and thereby became the first country to adopt such a policy (Takagi, 1988). In May 1973, Morocco moved out of fixed parity with the French franc to an own-currency basket peg. Cyprus announced a basket peg in July 1973. Malawi adopted a two-currency basket peg in November 1973 by abandoning its sterling peg. Algeria shifted from a Frenc franc peg to a multi-currency peg in January 1974. So also Mauritania in the same month. In September 1974, Australia, a developed country, shifted out of a dollar peg to a basket peg. Another major development was the decision taken in IMF to introduce a basket valuation for the SDR, the internationally created reserve asset, from July 1974. This attracted countries like Burma (January 1975), Iran (February 1975), Jordan (February 1975), Saudi Arabia (March 1975), and Qatar (March 1975) to switch over to an SDR peg. By the middle of 1975, there were at least nine developing countries following an currency basket peg and another seven on an SDR peg.[39]

Another development which is significant in relation to the Indian decision to shift out of the sterling peg was the expiry of India's foreign exchange guarantee agreement with Britain a mention of which was made earlier. We saw that effective September 1968, in order to avert further the heavy liquidation of sterling balances which followed the sterling devaluation in November 1967, Britain entered into agreements with some sterling area countries including India which provided a dollar value guarantee by the U.K. for the major portion of the sterling balances with these countries in return for maintaining a minimum of these balances with them. However, in January 1974, on account of the instability of the dollar itself, these guarantees were converted in terms of a basket of major currencies including the dollar. By Decembr 1974, the agreement with India expired and, therefore, the sterling balances were subject to fluctuations in the value of the pound which was still weak in the market. This prompted India to accelerate the diversification of foreign exchange reserves away from sterling from early 1975 which culminated in the snapping of the rupee's tie with sterling on September 25, 1975.

4.12 Move to a More Flexible System

Initially, the Indian basket system had a band of 4.5 per cent, ie.,2.25 per cent margin above and below the value of the basket. Since January 30, 1979 the band has been widened to 10 per cent, i.e.,5 per cent above and below the basket value. The earlier relatively narrower margins were a hangover from the temporary exchange rate regime that was established by the IMF after the Smithsonian agreement in December 1971. However, with the Second Amendment of the Articles of the IMF which came into effect from April 1978, the members were allowed freedom to choose any exchange rate regime of their choice except the one which is linked to gold. This freedom was utilized by India in opting for a broader band for the basket system. This revision of the margin and also the confidentiality with which it is operated might have been instrumental in the reclassification by the IMF of the Indian exchange rate arrangement as a managed floating system from 1979 onwards instead of a pure basket system as it was designated until then.[40]

The broadening of the basket margins which took place in early 1979, is a quite significant event in the evolution of the Indian exchange rate regime. Through this change the authorities were enhancing their manoeverability in order to employ the exchange rate as an instrument for achieving alternative objectives including the balance of payments adjustment without in any way violating the basic basket rule. Although this change was claimed to have been necessitated by larger fluctuations in international currency markets, the fact that this adversity could be converted into an advantage was not missed by the Indian authorities. This point is substantiated by the Reserve Bank statement:

> "Effective January 30, 1979, however, the exchange rate is being maintained with a wider band, not exceeding 5 per cent on either side, the change being found necessary in the light of the developments in the currency markets which had been character-

> ized by large and erratic fluctuations. The change, it was felt, would help in the fixing of a more appropriate exchange rate for the rupee and in imparting a measure of stability to that rate." (RBI, 1983, p.287)

The words "fixing a more appropriate exchange rate for the rupee" imply objectives other than stability. This aspect will be explored further in the next chapter.

4.13 Conclusion

We have traced the long history of India's exchange rate regime from the early 19th century which could throw much light on the present exchange rate regime. An important point emerging from this historical survey is that the rupee had generally been pegged to a major currency and independent floating had never been practiced in India. This is typical of a less developed country.

Another major point is that the present exchange rate regime bears the imprint of the long and intimate relationship which India had with Britain since the turn of the last century. However, there is a marked difference in the impact of this historic relationship on India's exchange rate regime as between the pre-1931 and post-1931 periods. Before 1931, the sterling link for the rupee had been quite unstable mainly because of the attachment of the rupee with silver. In contrast, from 1931 onwards the rupee-sterling link has been most stable. The formation of the sterling area with the onset of World War II characterized by tight exchange control around the area, reinforced India's exchange rate regime based on fixity of the rupee-sterling rate.

The firm relationship between the pound and the rupee established since the 1930s survived during the post-war Bretton Woods par value system which saw only two adjustments of the rupee-sterling rate: the first one in June 1966 when the rupee was devalued against all currencies and the second in

November 1967 when the pound itself was devalued. In June 1972 we note almost a repetition of the history of 1931; as the pound was floated the rupee kept parity with it. This time the fixed link with sterling lasted for three years and a quarter before finally yielding place to a basket peg in September 1975. The India's basket system, however, did not represent a complete break with sterling as sterling serves several functions in the new system including that of the intervention currency. For a detailed examination of this aspect as well as others of the Indian basket system we turn to the next chapter.

Footnotes: Chapter 4

1. There is no agreement among economic historians about the exact date of the adoption of a full gold standard in the U.K. and according to Harrod (1969, pp.15-7) 1821 is the most probable one. De Cecco (1987, p.540), however, states that Britain was on a gold standard since the beginning of the 18th century and after a suspension during the Napoleonic wars from 1797, it was resumed in 1819
2. See De Cecco (1984) pp.39-61 for an account of the spread of the gold standard.
3. The average price of silver in London was 60 5/8d per ounce in 1872 and in 1894 it was 28 15/16 d. (Vakil and Muranjan, 1927, p.38).
4. Keynes (J.M.K., I, pp.1-2) believed firstly, that the benefit of depreciation to exporters was largely at the expense of the rest of the community and secondly, that even the export advantage was temporary with the price rise triggered off by depreciation neutralizing it subsequently.
5. As noted by Harrod (1969, p.22) the meaning of gold exchange standard is not at all clear. It appears, however, that the gold exchange standard is called so because in that system the local currency is convertible into an international currency and the latter convertible into gold and, therefore, the former is indirectly convertible into gold. This, therefore, resembles the Bretton Woods par value system in which the dollar constituted the international currency legally convertible into gold. This has to be distinguished from the sterling standard which emerged in 1931 after the formation of the 'sterling bloc'. There the local currency was convertible into sterling and sterling itself was not convertible into gold.
6. Keynes (J.M.K., I, Ch.2) argued that several countries of Europe who were

on the so called gold standard at that time kept large balances abroad and used gold only as a marginal medium of exchange and, therefore, the currency system of these countries differ from the Indian system only in degree and not in kind.

7. The meticulous treatment and praise the Indian gold exchange standard received from Keynes in his Indian Currency and Finance (J.M.K., I) and the close resemblance the Indian system had with the post-war Bretton Woods system for which Keynes is a principal architect, made Johnson (1978, p.113) to suggest that the former is the precursor of the latter. This is, however, contested by Williamson (1983, pp.109-10) on two grounds: first, that in the above-mentioned book Keynes was speaking of a rational policy for a single small country within the international system rather than laying down the framework of the international system and second, that in 1942 Keynes denounced the gold exchange standard and only concurred to its perpetuation grudgingly.
8. This was mainly due to the sharp shortfall in silver production in Mexico arising from internal political turmoil there which was unrelated to the World War. See Vakil and Muranjan, op. cit., pp.109-10.
9. Pound was off the gold standard in March 1919.
10. 2s gold is higher than 2s sterling as sterling floated downward against gold after it went off the gold standard.
11. Keynes' view about the effect of exchange rate appreciation on exporters is now familiar: it is temporary and is more than offset by the benefits of stable prices on exporters and other sections of society. Besides, he argued that India had a complete or high degree of monopoly over some of her most important exports like jute, cotton, rice and tea. (J.M.K., XV, pp.275-9)
12. See Harrod (op. cit., pp.96-100) for a brief but lucid discussion of the

background of this decision and its later effects on Britain.

13. The issue of fixing an appropriate exchange rate for the rupee generated considerable public controversy during the time with the Indian economists and business interests arguing for a lower rate of 1s 4d and the government insisting on the then existing higher rate of 1s 6d. See Tomlinson (1979) for an evaluation of this controversy after over 50 years. See also Drummond (1981,Ch.2) for a detailed account of events connected with the maintenance of the rupee-sterling rate of 1s 6d during the 1930s.

14 This included not just the members of the British Commonwealth excluding Canada, but also Scandinavian countries, Ireland, Iceland, Egypt, Portugal and Iraq.

15. Besides the imposition of a general import tariff, a number of protective measures were taken by the U.K. including the imposition of quotas on foreign imports of food products. Foreign lending was prohibited and foreign investment was also brought under official control.

16. Jain (op. cit., p.38) gives the net contraction of rupee notes alone of Rs 102.50 crores during 1926-27 to 1930-31.

17. At this time the pound was still on the gold standard and, therefore, rupee's parity with sterling at 1s 6d meant parity with gold as well.

18. However, the Gold and Sterling Sales Regulation Ordinance, VII, 1931 under which the exchange control came into operation was withdrawn in January 31, 1932. (Jain, op. cit., p.54).See also Drummond (1981, Ch.2).

19. During the 10-year period ending March 1941, India exported 43 million ounces of gold worth Rs 3750 million. (The Cambridge Economic History of India, Vol. 2, 1983, Ch. IX, p.773). Keynes (J.M.K., I) recalls "Jevon's description of India as the sink of the precious metals always ready to absorb the redundant bullion of the West and save Europe from the more violent disturbances to her price level." (p.70). Please also see

Conan (1952, p.76) who gives an estimate of $150 million per annum over the years 1932-38 as the value of gold outflow from Indian hoards.

20. The strongest argument raised in India against the sterling standard was the loss of autonomy in following an exchange rate policy that is in tune with the economic conditions in India rather than following the pound, the movement in which is dictated by the economic conditions in Britain alone. Jain (op. cit. pp.44-54) for the details of various criticisms against the sterling peg.

21. The 'dollar problem' refers to the chronic shortage of gold and 'hard' currencies particularly of the U.S. dollars within the sterling area. As noted by Day (1954, p.45), although the dollar shortage may have existed in the sterling area in the 1930s, the first conscious awareness of it came with World War II which led to the imposition of rigid exchange controls in the sterling area as a whole. These controls served the purpose of mobilization and conservation of the means of payment outside the sterling area for the financing of the war.

22. The term 'dollar pool' is a misnomer as the pooling was done for not only the dollar (the U.S. and Canada) but also for gold and other foreign currencies. See Wright (1954, p.561). This source gives valuable details of the working of the dollar pool arrangement during the period.

23 The IMF was concerned about the continued existence of the sterling area as an entity. That came to the surface in 1950 after the Commonwealth Finance Ministers agreed that each member of the area would restrict imports from dollar area to 75 per cent of the 1948 level; the Fund in a common meeting with the GATT and the representatives of the sterling area refused to treat the 'dollar problem' as a common problem for the sterling area as a whole and reported the situation on a country-by-country basis. See IMF History, 1969, Vol. II, pp.338-41 for details of the controversy.

24. As quoted in Conan, op. cit., pp.107-8.

25. Tew (1985) views the developments in the international monetary scene during the post-World War II years as an evolution from a predominantly bilateral phase during 1945-49 to a binary one during 1950-58 to a final post-1958 phase of a unified system. See Tew (op. cit., Chs. 1, 2 and 3).

26. The currency convertibility established by major European nations in December 1958 is also termed 'external', 'non-resident' or 'partial' convertibility whereas that established in February 1961 by these nations is termed 'total' convertibility, i.e. both 'external and internal' convertibility. See IMF History (1969, Vol.II, pp.226-7). As the sterling accounts of the sterling area countries were treated as 'resident' accounts under the exchange control regulation of the U.K., they were convertible only from February 1961.

27. This is mainly due to the huge rise in imports with the launching of India's ambitious industrialization programme from the beginning of the Second Five Year Plan (1956-61).

28. India got freedom from British rule on August 15, 1947.

29. The Government of India (1966) pamphlet said, "During the heyday of the national struggle for independence in the early thirties, our political leaders and economists rightly blamed the British for fixing a high rate of 1sh. 6d for the Indian rupee rather than the lower rate of 1sh. 4d. We rightly feared that at the higher rate our industrialisation would suffer as our industries would have to face stiffer competition from British products. This is equally true today." (p. 8).

30. The role of external pressure for the devaluation is also clear from the very same government pamphlet mentioned above which said, "There was a widespread belief among international agencies and among

international banking and trading community, that the par value of the rupee before devaluation was totally unrealistic ..... It also made it almost impossible for us to count on further assistance from these international agencies." (p. 7).

31. The 1967 devaluation of sterling is considered to have given shock not only to the sterling system but also to the entire international monetary system by shaking the confidence in key currencies as a whole.

32. It may be noted that the exact composition of the foreign exchange reserves are not disclosed by the Reserve Bank to the public.

33. The figures are computed on the basis of data from various issues of Reserve Bank of India Bulletins, statistical sections. It may be noted that on the export side the loss of sterling area share was captured mainly by the USSR, Japan and non-UK West European countries.

34. This is based on studies conducted by the Reserve Bank of India which appeared in different issues of the Bank Bulletins.

35. The data on invoicing pattern of India's trade are available only from 1979-80 onwards. In 1979-80, 92 per cent of India's exports to Japan and 57 per cent of India's imports from Japan were invoiced in U.S. dollars. (See RBI Bulletin, 1988, pp.41-2).

36. Both these interpretations were made earlier by Chawla (1983), pp.9-11.

37. This is based on IMF's Multilateral Exchange Rate Model (MERM) - weighted effective exchange rate given in International Financial Statistics (IFS).

38. It may be relevant to note that in November 1973, following the generalized floating of major currencies the IMF extended the scheme of "central rates and wider margins", originally established in the context of fixed exchange rate regime, with respect to members following a fixed link with an intervention currency even if that currency itself is floating. See IMF

Survey (1976, March 1, p.73).

39. IMF Survey (1976, February 2, p.35). Also see IMF Annual Reports on Exchange Restrictions (1974, 1975 and 1976) for individual cases. We discussed generally these developments in Chapter 2.

40. See IMF Annual Report (1980, pp.53-6) for a brief discussion of this definitional change adopted by the IMF. Aghevli (1981), however, considered the Indian exchange rate system right from September 1975 as a managed floating system. The argument is that as long as the basket remains undisclosed, it is not clear whether a change in the value of the home currency is due to a change in the value of the basket currencies or due to an ad hoc adjustment in the weights of these currencies in the basket.

APPENDIX

Table A4.1 Major Events in India's Exchange Rate Regime

Year/ Period	Events	Remarks
1818	Silver rupee made the unlimited legal tender in South India.	With this a currency reform began in India.
1835	Silver rupee made the sole unlimited legal tender for the whole of British India by the Gold and Silver Coinage Act passed in August.	This marks the beginning of a silver standard in India.
1872-94	The historic slump in silver price. In response to Herschell Committee (1892) recommendation, mints closed for silver on private account and official gold ratio fixed for the rupee at 1s 4d in 1893.	This meant that the rupee was to become a token coin with its face value divorced from metallic value.
1898	The rupee touches the official rate of 1s 4d in January. Fowler Committee recommends a gold standard with a gold currency.	
1898-1916	India drifts into a gold exchange standard with a stable value for the rupee at 1s 4d.	
1917	Sharp rise in silver price. Bullion value of the rupee overtakes its face value in August.	Gold exchange standard breaks down and India, in effect, forced to return to silver standard.
1919-20	Babington Smith Committee (1919) recommends relinking the rupee with gold at 2s per rupee. Government fails in attempts to maintain the high rupee value.	Britain left the gold standard in March 1919.
1924	Rupee rises to 1s 6d in October.	With the pound off the gold and below par, rupee's value o 1s 6d meant a lower 1s 4d gold which incidentally was the pre-war parity for the rupee.

Year/ Period	Events	Remarks
1926-27	Hilton Young Commission (1926) recommends the gold bullion standard and the statutory fixing of 1s 6d for the rupee. Government implements the proposals in March 1927 with passing of the Currency Bill but the provision of convertibility of rupee into gold made optional for government.	The discretionary rupee-gold convertibility reduces the system to a gold exchange standard.
1931	Britain departs from gold standard in September. Rupee formally tied to sterling at the prevailing rate of 1s 6d.	This inaugurates a sterling standard for the rupee.
1935	The Reserve Bank of India set up in April with the Reserve Bank of India Act. The management of the exchange value of rupee passes on to the Bank from the government.	
1939	Exchange control introduced in India under the Defence of India Rules in September as a part of the sterling area arrangement.	
1946	India intimates a par value for the rupee to the IMF in December but keeps the parity with sterling unchanged at 1s 6d, i.e. £1 = Rs 13.33.	
1947	Exchange control placed on the statute through the Foreign Exchange Regulation Act in March. India gets independence from the British rule on August 15.	
1949	Sterling devalued from $4.03 to $2.80 (30.5 per cent) in September. The rupee-sterling rate remains intact at £1 = Rs. 13.33.	Scandinavian countries and every sterling area countries except Pakistan devalued with sterling.
1961	Full current account convertibility restored to sterling in February. The dollar pool arrangement within the sterling area dismantled.	Sterling area relation becomes voluntary and informal.

Year/ Period	Events	Remarks
1966	Rupee declined by 36.5 per cent on June 6; rupee-sterling parity changes to £1 = Rs 21.	
1967	Pound devalued in November from \$2.80 to \$2.40 (14.3 per cent); rupee-sterling parity changes to £1 = Rs. 18.	
1968	Britain enters into agreement with India to restrict the drawing down of sterling reserves from September.	This, to some extent, revives the formal nature of the sterling area arrangement.
1971	Rupee pegged to the U.S. dollar on August 22. Rupee re-pegged to sterling on December 19 at the central rate of £1 = 18.9677.	During the short spell of dollar peg, sterling continued to be the currency of intervention.
1972	Pound floated on June 23; India maintains the parity with sterling unchanged.	This repeats the event of 1931 when the pound floated with the departure from gold standard by Britain.
1975	India adopts a basket peg on September 25 with a provision for ±2.25 per cent margins. Pound, however, continues as the intervention currency.	
1979	The margins for maintaining the basket-determined value of rupee broadened to ±5 per cent on January 30.	

Chapter 5
The Indian Basket System

5.1 Introduction

The Indian basket system merits attention not merely as a model of the new and increasingly popular exchange rate regime of developing countries but much more due to the specific features it has, and particularly those which it acquired during the past fourteen years of its operation. Although exchange rate stability, defined in terms of the weighted average of the array of major bilateral exchange rates, has been at the heart of the decision to opt for a basket system, it appears that other objectives began to emerge subsequently that necessitated alteration of strategies in the operation of the system.

Before examining the details of the Indian exchange rate system it would be useful to describe the system very briefly. The currency basket around which the Indian exchange rate system operates, is valued in sterling and also, any exchange rate adjustment made by the authorities in response to changes in the value of the basket is announced in terms of the rupee-sterling rate. However, as referred to in the last chapter, the composition of the basket as well as the details of the operation of the system are confidential. As a result, we cannot really observe from the day-to-day changes in the rupee-sterling rate whether adjustments have been carried out for the purpose of exchange rate stability or any other alternative objective. In short, the Indian exchange rate regime is highly discretionary in nature.

This chapter is divided mainly into two parts. In the first part, we attempt to illustrate the mechanics of the Indian basket system. In the second part, we examine the different features of the system in more detail. Here we also make clear why the Indian exchange rate system should more appropriately be called a 'discretionary crawling basket peg'.

5.2 Mechanics of Indian Basket System

The confidentiality of the Indian basket system constrains to a great extent a proper understanding and assessment of the system. In the absence of sufficient official information, we mainly rely on Varghese (1984a, 1986), for illustrating the details of the Indian basket mechanism. Besides, it is known from unpublished official sources, mainly through discussions with the Reserve Bank of India officials, that the Indian basket system resembles the SDR valuation, with the major difference that, in the Indian basket system the pound sterling takes the role of the dollar in the SDR valuation as the unit of account.

By definition, a currency basket consists of specified amounts of selected currencies summed up together after being reduced into a common measure, the numeraire. The units of each selected currency which form part in the basket, which are also called the currency components of the basket, are determined on the basis of the relative weight assigned to that currency in the basket. For the purpose of illustration, we assume that the selected currencies of the Indian basket peg which are also termed the basket currencies are four, namely, the U.S. dollar, the Japanese yen, the pound sterling and the Deutsche mark. Essentially, four steps are involved in the construction of the Indian basket which are listed below:

(1) selection of currencies for inclusion in the basket;

(2) allocation of relative weights to the chosen currencies;

(3) computation of the exchange rates of the basket currencies

against the numeraire, the pound, on the day of the basket link; and

(4) working out of the currency components in the basket by multiplying the exchange rates as obtained at (3) with their respective weights obtained at (2).

These steps are illustrated in Table 5.1.

Table 5.1
Illustration of the Construction of the Indian Basket System on the Date of the Basket Link, September 25, 1975[a]

Currency	Weight[b]	Exchange rate per £1	Currency components as on 25.9.75 (3 x 2)
1	2	3	4
U.S. dollar	0.50	2.05	1.025
Japanese yen	0.25	620	155
Pound sterling	0.15	1.00	0.150
Deutsche mark	0.10	5.45	0.540
Total	1.00		

a. All numbers in the table are fictitious used only for the purpose of illustration
b. Weights are also purely imaginary. As explained in the text, the official information is insufficient to work out the actual weights.

It may be noted that on the first day of the basket-peg, the Reserve Bank actually adjusted the middle rate[1] of the rupee against sterling arbitrarily upwards to £1 = Rs 18.3084 from £1 = Rs 18.60, i.e. by 1.6 per cent. The reason for this revaluation of the rupee might be to offset, to some extent, the sharp depreciation of the rupee suffered against the non-sterling currencies as sterling had been depreciating against other major currencies after it was floated in June 1972, and also as a signal of a reversal of trends in rupee-sterling rate. After having fixed the value of the rupee against the pound at Rs. 18.3084 on the day of the basket link, the valuation of the rupee on any subsequent day requires the knowledge of exchange rates of the basket currencies against the pound on that day. (The Reserve Bank uses the London market quotations of the previous day for the calculation of the basket value of the rupee. This is because of the time zone difference between India and London; London market is closed when Indian market just opens for business and the former opens only in the afternoon of the Indian time). The calculation of the new value of the basket on any day after the introduction of the basket peg is illustrated in Table 5.2.

In Table 5.2 we assumed that the U.S. dollar depreciated by 5 per cent, Japanese yen and Deutsche mark appreciated by 15 per cent and 7.5 per cent respectively, all against the pound in comparison with the day of the rupee's basket link. (See the original exchange rates in Table 5.1). In column (4), the figures against each currency are derived by dividing the original units of that currency in the basket (column 3) by the new exchange rate of that currency per pound (column 2). The results indicate the new percentage contribution of each currency to the basket value as that currency's exchange rate changed.

Table 5.2

Illustration of Daily Basket Valuation of Rupee

Currency	Exchange rate per £1	Currency components as on 25.9.75[a]	New value of basket in terms of £ (3/2)
(1)	(2)	(3)	(4)
U.S. dollar	2.1579	1.025	0.4750
Japanese yen	539.13	155	0.2875
Pound sterling	1.000	0.150	0.1500
Deutsche mark	5.0698	0.545	0.1075
		Total	1.0200
	Value of basket = £1.02		

a. As worked out in Table 5.1

The summation of all such contributions by each currency yields 1.02 as against 1 on the day of the basket peg. This means that the value of the basket has improved by 2 per cent in terms of the pound and this has come about as a result of the changes in exchange rates of the different currencies in the basket against the pound.

An important thing that has to be noted in the above computation of the value of the basket is that the change in the value of the basket, i.e., 2 per cent, is the average of the changes in the exchange rates of all basket currencies against sterling, each one weighted according to the original basket weights. This is brought out in Table 5.3 with the help of index numbers.

Table 5.3 Computation of the Value of Indian Basket via Index Number Method

Currency	Original exchange rate	New exchange rate	Weight[a]	Value of basket (3x4)
(1)	(2)	(3)	(4)	(5)
U.S. dollar	100	95	0.50	47.50
Japanese yen	100	115	0.25	28.75
Pound sterling	100	100	0.15	15.00
Deutsche mark	100	107.5	0.10	10.75
			Total	102.00

a. As in Table 5.1

As shown in Table 5.3, we start with a base of 100 and find out the change in the value of the basket by computing the weighted average (arithmetic) of the indices of the various exchange rates against the pound. Repeating the earlier example, we assume that the dollar depreciated by 5 per cent, yen and D.M. appreciated by 15 per cent and 7.5 per cent respectively, each one against the pound. The total in column (5) of the table gives the new basket value as 102 which is exactly equal to that obtained in Table 5.2.

Now, if the authorities go by a rigid basket peg, then the value of the rupee would have to be adjusted upwards against the intervention currency, sterling, by 2 per cent in direct response to the change in the value of the basket. However, the Indian system is not a rigid basket peg. It is operated flexibly by the discretionary use of the margins of 2.25 per cent on either side of the actual value of the currency basket up to January 29, 1979, and plus and minus 5 per cent since then. That can imply, first of all, that since the movement in the basket value in our example is within these margins, the authorities need not adjust the value of the rupee at all. In not making the adjustment, the authorities would be permitting the non-sterling bilateral rates of the rupee to change *pari passu* with the changes in exchange rates of non-sterling currencies against sterling in foreign exchange markets through the process of international arbitrage. Secondly, it is to be noted that if the athorities, on the other hand, decide to adjust the rupee-sterling rate within the margins, they still have the option in adjusting to the full extent of the change in the observed basket value or only adjusting partially. That is, in our example, instead of appreciating the rupee against the pound by the full 2 per cent, it can be altered by less than 2 per cent. Thirdly, it can also be envisaged that the authorities depreciate the rupee, in this case up to a maximum of 3 per cent, against sterling and could still be within the lower margin of -5 per cent of the basket parity.

Continuing with our example, let us suppose that the Bank adjusts the rupee value to the full extent of the change in the value of the basket by announcing a 2 per cent appreciation of the rupee against sterling, i.e., from £1 = Rs. 18.3084 to £1 = Rs. 17.9494. It should be understood that when this change is announced, then the rupee instantly appreciates at the same rate of 2 per cent from the existing market rates against all currencies, not just against sterling, through the application of cross rates between sterling and other currencies.

At this stage, it would be worthwhile to examine the proposition that the operation of a rigid basket peg would lead to stabilization of the effective exchange rate. Table 5.4 allows us to view the sequence in an index form. When

Table 5.4

Illustration of a Rigid Basket System

Name of rupee rate	Weight	Base rupee rate index	Market rupee rate index	Rupee index after adjustment
(1)	(2)	(3)	(4)	(5)
Dollar/rupee	.50	100.00	105.00	107.10
Yen/rupee	.25	100.00	85.00	86.70
Sterling/rupee	.15	100.00	100.00	102.00
D.M/rupee	.10	100.00	92.50	94.35
Effective exchange rate index[a]		100.00	98.00	99.96

a. Defined in terms of basket currencies

the exchange rates of basket currencies change against sterling in the international market, it is automatically reflected in rupee rates; except the sterling-rupee rate, all other rupee rates change by the same extent by which sterling changed against those currencies. In the present example, dollar depreciated by 5 per cent, yen appreciated by 15 per cent and Deutsche mark appreciated by 7.5 per cent, all against sterling. Therefore, as seen from Table 5.4, column (4), the rupee appreciates by 5 per cent against the dollar, depreciates by 15 per cent against the yen and depreciates by 7.5 per cent against the Deutsche mark. The weighted average of these rupee rates with weights equal to the original basket weights as in column (2) indicates a decline of the effective exchange rate of the rupee by 2 per cent, to 98. This corresponds to the increase in the value of the currency basket which was computed as 2 per cent in Table 5.3. At the next stage, if the authorities follow the rigid basket rule, the rupee will be appreciated by 2 per cent against sterling which will be followed in the market by the appreciation of the rupee by the same extent against all other currencies in the basket. This is shown in column (5) of the Table 5.4 which yield a weighted average exchange rate of 99.96 which is almost equal to the base rate. This is how the rigid application of the basket rule results in the stabilization of the effective exchange rate of the domestic currency in terms of the basket currencies.

The next step in the analysis of the working of the Indian basket system is to examine how a subsequent value of the basket is determined once an adjustment of the rupee-sterling rate is made. This part is crucial to a proper understanding of the system and, unfortunately, this has not been explored by earlier writers. For illustration, let us assume that exchange rates of basket currencies moved against the pound in a similar way as before the previous adjustment, i.e.,the dollar depreciated again against the pound by 5 per cent, the yen and the D.M. appreciated by 15 per cent and 7.5 respectively. The resulting change in the basket value is calculated as in Table 5.5.

Table 5.5

Illustration of a Further Change in Daily Basket Valuation of Rupee

Currency	Exchange rate per £1	New currency components[a]	New basket value in terms of £ (3/2)
(1)	(2)	(3)	(4)
U.S. dollar	2.2715	1.0790	0.4750
Japanese yen	468.81	134.78	0.2875
Pound sterling	1.000	0.15	0.1500
Deutsche mark	4.7161	0.5070	0.1075
		Total	1.0200

Value of basket = £1.02

a. The new currency components are derived by multiplying the earlier exchange rates given in Table 5.2 by their respective weights in the basket shown in Table 5.1.

The most important thing to note in Table 5.5 is that the currency components are different from that at the start of the basket peg. As indicated at the footnote of the table, they are obtained by multiplying those exchange rates that prevailed at the time of the previous adjustment with the original currency weights. It is also important to see the pattern of change in the currency components: depreciating currency enlarged its units and appreciating currencies contracted their units, both exactly in proportion to the corresponding depreciation and appreciation. This process, in effect, restores the original relative weights of each currency in the basket. To put it differently, in the Indian basket system, each of the currency components undergoes changes in such a way as to re-establish the original weight allotted to the respective currency at the start of the basket peg.

The above-mentioned characteristic of the Indian basket mechanism makes it different from the SDR basket valuation, although the former resembles the latter in other respects. The basket-valuation of the SDR is based on what is called the "standard basket" which is defined by fixed amounts of five major currencies (16 currencies before January 1981) whose relative weights change[2] daily as a result of changes in exchange rates. The Indian basket valuation of the rupee, it appears, is based on the "adjustable basket" which is defined in terms of certain major currencies whose amounts vary as a result of changes in daily exchange rates but whose relative weights in determining the changes in the value of the basket is kept intact all along. It is interesting to note that the "adjustable basket" method was one of the alternatives to the "standard basket" which was considered by the IMF for valuation of the SDR before finally choosing the latter (see Polak, 1974, pp. 12-16).

5.3 Main Features of Indian Basket System

Broadly we can distinguish between three main characteristics of the Indian basket system. They are:

(i) the significant role given to sterling which may be called the sterling legacy of the system;

(ii) most of the details of the system are undisclosed to the public; and

(iii) the large flexibility of operation.

These three features are examined below, one by one.

(i) Sterling Legacy:

The basket system which replaced the historic sterling peg still retains some of the vestiges of the past sterling link. We have occasion to refer to the highly diminished role of sterling in the world[3], in general, and in India, in particular. According to the official statistics on invoicing of India's total merchandise trade, sterling constituted only about 10 per cent during 1979-80 to 1981-82 and the share has declined since then.[4] On the other hand, the share of the dollar in the currency invoicing of India's total merchandise trade during the same period was about 57 per cent and has increased since then.[5] In spite of the above realities, sterling occupies a prominent place in the new exchange rate regime of India.

Joshi and Little (1987, p. 377) distinguish between three different functions of a foreign currency in the exchange rate regime of a country: (1) as the intervention currency, i.e. the currency the central bank normally buys and sells, (2) as the designation currency, i.e. the currency in terms of which the value of the domestic currency is announced, and (3) as the peg currency, i.e. the currency to which the value of the domestic currency is fixed with a certain margin. In the context of a basket peg there is no single peg currency but a currency composite to which the domestic currency is tied. That in turn necessitates a numeraire in terms of which the currency composite is valued. Let us call the foreign currency which is employed as the unit of account of the basket peg, the valuation currency. In the context of the Indian exchange rate regime, sterling serves as the currency of intervention, designation and also as the currency of valuation.

The role of sterling as the intervention currency needs to be viewed in the background of exchange control practiced in India. In developed countries which generally follow a floating exchange rate system characterized by the absence of exchange control regulations, the monetary authorities intervene in the foreign exchange market in order to smooth out exchange rate fluctuatiions and sometimes to influence the trends in exchange rate. But in India the supply and demand in the exchange market are regulated through controls on trade and capital transactions and, the intervention of the central bank is directed towards meeting the already controlled net demand in the market. Besides, it is normally expected that the banks meet their exchange needs through the inter-bank market and also, to some extent, through transactions with banks abroad and approach the central bank only as the last resort (Rangarajan, 1985).

The Reserve Bank of India makes spot purchases from the banks not only sterling but also the U.S. dollar (since October 1972), the Deutsche mark (since March 1974) and also the Japanese yen (since end-May 1974). The Bank also buys these four currencies for forward delivery as well. However, in order to meet the residual demand for foreign exchange, until very recently, sterling has been the only currency which the Bank sells and that too only on a spot basis[6].

Even if the Reserve Bank meets only the highly regulated residual demand in the exchange market, that itself is too large to be satisfactorily handled by the sale of sterling alone. Sterling's significance as an invoicing currency for India's merchandise imports is even less than for the total trade which was described above; it accounted for only 8.8 per cent of the import invoicing during 1979-80 to 1981-82 as against 64 per cent by the dollar. The practice of selling to the banks only sterling, firstly necessitated the large holdings of foreign exchange by the Bank in a currency not justified by the pattern of the country's external transactions. Secondly, for the banks it involved unnecessary additional transaction costs in first buying sterling from the Bank and later converting them into dollars mainly in international markets for meeting the dollar requirements. Therefore, the continued sales of sterling alone by the Bank was an anomaly. This was rectified, however, in February 1987 by announcing the decision to sell also the U.S. dollar. This is a major step in the right direction and this reform is expected to reduce significantly the role of sterling as an intervention currency in the years to come.

As regards the functions of designation and valuation, it may be stated that the decision on whether to retain sterling or to make a switch to the dollar depends mainly on two considerations: first, of the two currencies, which one is more stable? and, second, which currency is more important for India's external transactions? As regards the first, the choice is difficult in the light of the experience in the past as can be seen from Table 5.6. The stability performance of both sterling and the dollar is almost the same during 1979-85 in relation to the SDR. With regard to the second question, there is no doubt that the dollar is much more important than sterling for India's transactions. Varghese (1979) adds another consideration here which arises from the dollar's pre-eminent international position as the vehicle currency[7], namely, that the dollar rates are the direct quotations in international markets and all other rates including the sterling rates even in London[8] are derived from the dollar quotations and, therefore, contain distortions due to conversion costs. After having recognized the dollar as a currency of intervention, there appears to be no problem in recognizing it also as the currency of designation and valuation in the Indian exchange rate regime.

Table 5.6

Stability of Sterling and Dollar in terms of SDR (1979-85)[a]

	Coefficient of Variation	Annual Average Percentage Change
Pound sterling	0.10	-2.66
U.S. dollar	0.13	2.26

a. Based on monthly average of observations

Source: Extracted from I.M.F.(1987, p. 54)

(ii) Confidentiality:

The confidentiality of the Indian basket peg is at two levels: first, with regard to the composition of the basket, and second, with regard to the operation of the margins of the basket. The government and the Reserve Bank have not divulged to the public the currencies that constitute the Indian basket. Although official pronouncement has it that the Indian basket system is based on a selected number of currencies of India's trading partners, it provides neither the number of currencies in the basket nor the cut-off point regarding trade share to work out that number.

It is claimed officially that a disclosure of the composition of the currency basket would encourage speculation in foreign exchange markets (RBI, 1983, p. 287). If the composition of basket is known, the market agents can predict the future changes in various bilateral rupee rates and make speculative profits. This is due to the possible gap between the actual change in the value of the basket and the authorities' announcement of exchange rates in response to it.[9]

In the meanwhile, foreign exchange dealers who are constantly in touch with exchange rate movements abroad can earn potential profits by either short-selling or short-buying. Even though exchange control regulations prohibit speculation in foreign exchange markets mainly by insisting that the banks maintain square or near square positions in each foreign currency at the end of each day, the secrecy surrounding the basket mechanism would reduce the incentive to violate the exchange control regulation on speculation by making the future value of the rupee rates unpredictable. This fear of speculation on the part of authorities could also be one of the reasons why the Indian government did not find favour with an SDR peg whatever be its other merits.[10]

The confidentiality attached to the margins of theIndian basket system is not relating to the extent of the margin (that is very well known), it is regarding the mechanics of operation of the margin, i.e., it is not generally known what principles are followed in the operation of the margins provided in the basket peg. Particularly since the margins are wide, the authorities can exercise considerable discretion in their operation. It is not disclosed how exactly the authorities make use of their discretion in this regard.

One reason for the reluctance of the authorities to divulge the nature of management of the basket margins could be again to defeat speculation on the future value of the rupee. We saw earlier that the very intention of not disclosing the composition of the Indian basket was to discourage speculation. However, it is quite possible that the foreign exchange operators can still estimate the currency composition of the basket by closely watching the movements in various bilateral rates of the domestic currency for some period of time. The operation of the margins in a highly flexible and unpredictable fashion by the authorities can prevent this from happening by making the functional relationship between the domestic currency and others somewhat imprecise (Takagi, 1988, pp. 275-6).

The confidentiality property is not unique to the Indian system. As noted by Takagi (op. cit., p. 276) most country-specific baskets of developing countries are undisclosed to the public. However, the more distinguishing feature of the Indian system stems from the large margins it provides for and also the way those margins are used in practice by the authorities. This is discussed in more detail below.

(iii) Flexibility:

It was pointed out in the last chapter that the value of the rupee was initially maintained within a margin of 2.25 per cent on either side of the basket-determined parity and these margins were widened since end-January 1979 to ± 5 per cent. The presence of wide margins and the manner in which these margins are operated both contribute to the flexibility of the exchange rate system.

It is generally expected that the larger the margins provided in the maintenance of the parity, the larger the exchange rate instability will be with respect to the basket of currencies. However, one needs to take into account two other important considerations before commenting on the impact of margins on exchange rate stability: firstly, the <u>frequency</u> with which the rupee-sterling rate adjustments are made in response to changes in the value of the basket and secondly, the <u>extent</u> to which the adjustment of the sterling-rupee rate is done

with respect to a given change in the value of the basket. For example, even if there are large margins, if the rupee-sterling rate is continuously adjusted and that too to the full extent of the changes in the value of the basket, that could provide more stability than in the case with smaller margins but infrequent rupee-sterling adjustments that are not related to the extent of actual basket value changes.

Table 5.7 gives the picture of the frequency and average magnitude of rupee-sterling rate changes since the inception of the basket peg in September 1975. The table brings out a clear shift in the strategy of management of the basket system. That is, the first two years or so of the basket peg have been managed through fewer rupee-sterling adjustments with the average rate of adjustment being larger compared to the rest of the period from 1978, when the management involved larger and larger number of adjustments with the average rate of adjustment becoming quite smaller[11].

It is of genuine interest to know what has been the intention of the authorities, for the above-mentioned shift in the strategy of exchange rate management. Basically, a change in the value of the rupee-sterling rate can be motivated by the authorities' desire either (a) to stabilize the value of the rupee against the basket, or (b) to change the value of the peg against the basket. A change in the value of the rupee against the basket can be made by the authorities either to the full extent of the prescribed margins or within them.

Table 5.7

Rupee-Sterling Rate Adjustments since September 25, 1975

Year	Number of changes	Average magnitude of change[a] (per cent)
1975	1	0.99
1976	8	3.07
1977	1	3.49
1978	7	1.74
1979	13	1.48
1980	34	0.62
1981	71	0.98
1982	94	0.52
1983	125	0.55
1984	142	0.52
1985	157	0.67
1986	157	0.49
1987	137	0.46

a. Regardless of sign

Source: Computed from raw data of Reserve Bank of India middle rates (averages of buying and selling rates) available in Reserve Bank of India Bulletin, various issues.

In fact, a constant rupee-sterling rate can also be interpreted in a similar manner, i.e., it may either represent (i) a no change in the value of the basket and, therefore, is associated with the stabilization purpose, or (ii) a change in the value of the rupee against the basket that occurred in the market. The change in the value of the rupee against the basket could be either to the full extent of the basket margins or only to a partial extent of the margins.

In order to assess whether the rupee-sterling adjustments by the authorities were intended for the purpose of exchange rate stabilization or to bring about a change in the value of the peg, however, requires the knowledge of what constitutes the actual official currency basket. But, as emphasized earlier, we do not have adequate information about the official basket. Although one can examine the actual impact of the authorities' actions on the basis of an appropriately constructed basket, unfortunately one cannot draw any strong conclusion about the actual intention of the authorities from exchange rate movements based on such a basket unless it approximates the official basket.

Therefore, we attempted to construct a basket which we believe could approximate the official basket. We consider four currencies, namely, the U.S. dollar, the Japanese yen, the pound sterling and the Deutsche mark, as constituting the official basket. These currencies are chosen, firstly because they belong to India's most important non-Socialist trading partners jointly accounting for nearly half of India's trade with all countries other than those in the Socialist bloc during the three years prior to the introduction of the basket peg, i.e., 1972-74. Secondly, they are the only convertible currencies which the Reserve Bank buys from the banks. Thirdly, it might be possible that, for the sake of convenience in operation as well as due to the availability of direct sterling quotations, the authorities have gone in for a narrower basket than otherwise. These four currencies are combined to form the basket with weights in proportion to the share of the corresponding countries in India's total trade during 1972-74 (i.e., U.S. dollar .370, Japanese yen .263, Pound sterling .230, and Deutsche mark .137).

Table 5.8 gives rupee's instability measured in terms of the 4-country trade-weighted effective exchange rate index (base:1975=100) for the years 1970 to 1987. The details of the methodology of construction of alternative measures of exchange rate instability are explained in Chapters 6 and 7. Fig. 5.1 gives the graphing of the data from Table 5.8. Both Table 5.8 and Fig. 5.1 indicate that, after a considerable reduction in rupee's instability in the first two years of the basket peg, i.e., during 1975-77, rupee's instability worsened substantially and remained higher than the level of 1977 till 1983. Therefore, it seems correct to state that, although there has been a more frequent small-step adjustments in rupee-sterling rates since 1978, they have not resulted in lower instability of the rupee's effective exchange rate based on what likely to be the official basket but rather the opposite. From this one may conclude that the exchange rate management since 1978 has been motivated by considerations other than stability of the rupee against the basket.

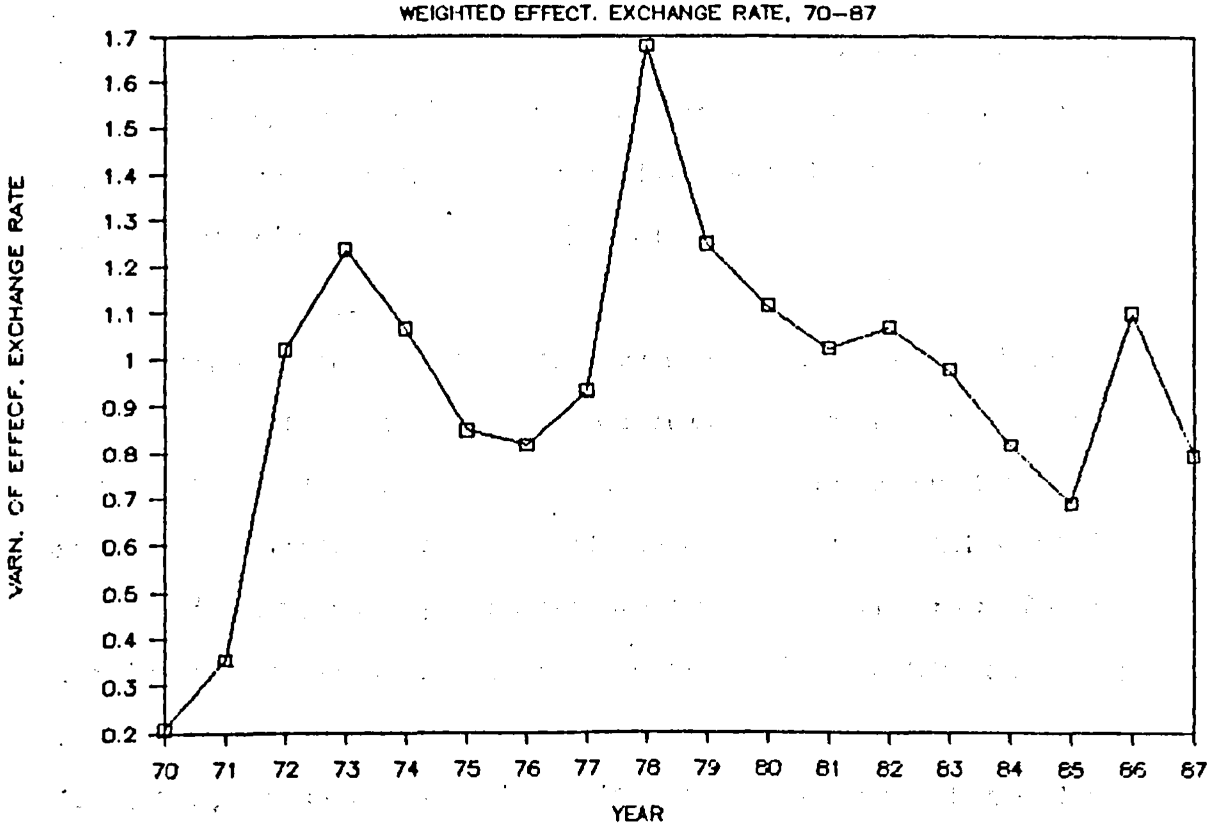
Table 5.8

Variation of 4-Country Trade-weighted Nominal Effective Exchange Rate of Rupee (VNEER4), 1970-87[a]

Year	VNEER4
1970	0.2081
1971	0.3557
1972	1.0193
1973	1.2367
1974	1.0645
1975	0.8460
1976	0.8162
1977	0.9290
1978	1.6793
1979	1.2479
1980	1.1135
1981	1.0207
1982	1.0673
1983	0.9742
1984	0.8159
1985	0.6887
1986	1.0990
1987	0.7915

a. Annual averages of monthly moving standard deviations of effective exchange rate, computed for each month based on observations for the previous 12 months. See Chapter 7 for details of construction methodology.

FIG. 5.1 VARIATION OF 4-COUNTRY TRADE--
WEIGHTED EFFECT. EXCHANGE RATE, 70-87

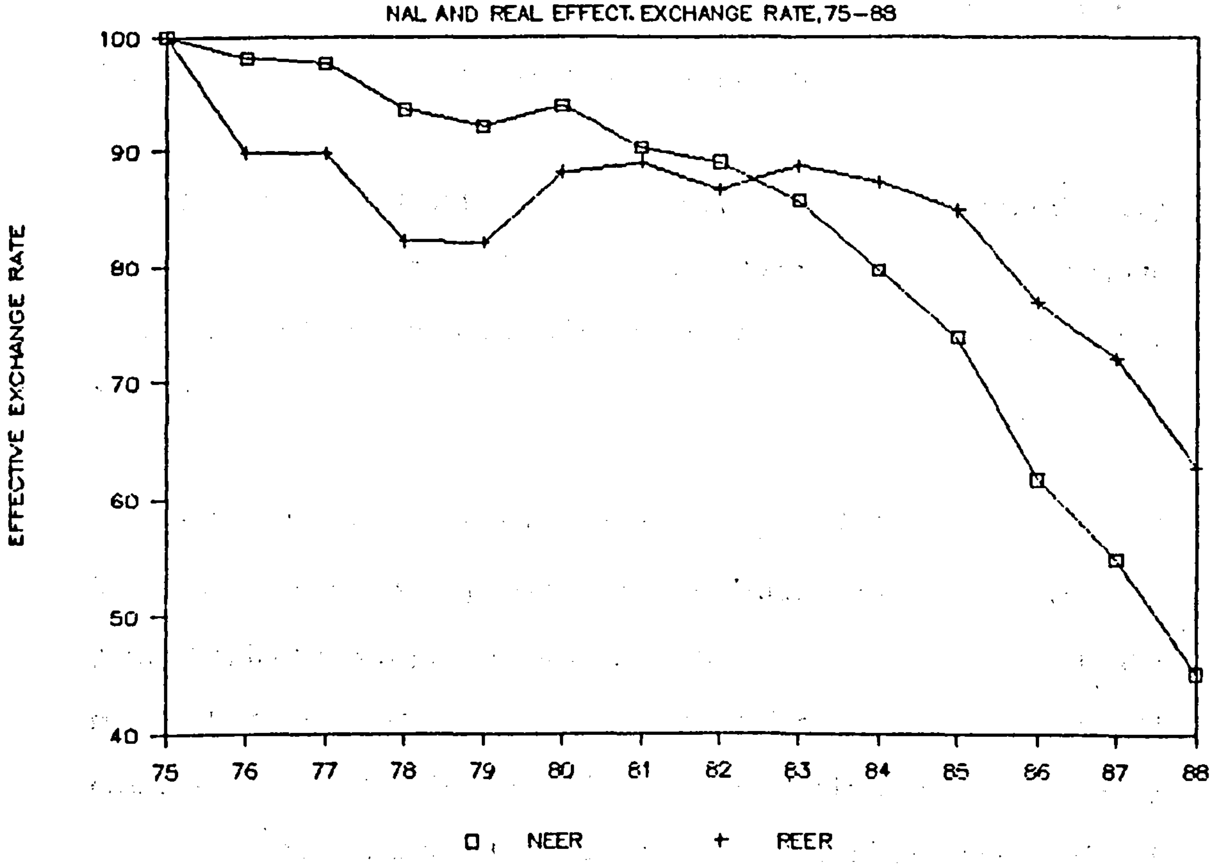


Some of the earlier studies [e.g., Nayak (1977), Chawla (1983), and Varghese (1984a)] pointed out that the targeting of the rupee-dollar rate, the most important bilateral rate for India's external transactions, could be an objective of the management of the Indian basket system, i.e., the rupee-sterling rate adjustments could have been so carried out as to minimize the appreciation or depreciation of the rupee against the U.S. dollar. Another aspect of exchange rate management could be the use of the exchange rate as an anti-inflationary weapon, i.e., to raise the exchange rate with a view to bringing the rate of inflation down. These two aspects of India's exchange rate management will be examined in detail in Chapter 10.

Another objective of India's exchange rate policy could have been the maintenance of the stability of rupee's real effective exchange rate. This requires the depreciation or appreciation of rupee's nominal effective exchange rate in such a way as to offset the inflation differential between India and abroad. That possibility is demonstrated by Varghese (1986) who found a 'crawling peg' type of exchange rate management in India particularly during 1982-85, i.e., there had been a nominal depreciation of the rupee in small steps during the period to the extent of neutralizing the larger inflation in India than that, on the average, in her major trading partners. Yet another objective towards which the basket system has been directed to, might be for effecting a gradual real depreciation of the rupee. This is a step further beyond the crawling-peg mechanism and involves the gradual nominal depreciation of the rupee at a rate faster than the relative inflation.

Fig. 5.2 illustrates the above two cases with the help of trends from the 4-county trade-weighted nominal and real effective exchange rates for 1975 to 1988. We note that the average real effective exchange rate (REER) remained

FIG.5.2 4-COUNTRY TRADE-WEIGHTED NOMINAL AND REAL EFFECT. EXCHANGE RATE, 75-88



nearly constant during 1980 to 1985 where as the nominal effective exchange rate has been steadily depreciating during the same period. Generally during 1980-85 (except in 1982), the rate of inflation in India has been higher than the average of her major trading partners and the nominal effective exchange rate has been depreciated gradually to offset the inflation differential. Particularly since 1985 the rate of nominal depreciation has been faster than the inflation differential such that there has been a real depreciation of the rupee.

In short, it appears that there has been a gradual evolution within the very same basket peg arrangement in India whereby the system has been tailored to achieve alternative objectives in addition to the original one of exchange rate stability

.It is, however, important to know how possibly the Indian authorities could have achieved the above objectives without violating the basic basket rule. In particular, how was it possible to bring about a gradual depreciation of the rupee within the basket system as a strict application of the basket rule should result in stability in the effective exchange rate? This is clear from the earlier discussion of the Indian basket mechanism. Basically, the larger the margins of the basket peg and the higher the flexibility with which those margins are operated, the better the possibility of effecting a gradual depreciation. We may, however, point out three ways in which that can be done:

(i) when there is rise in the value of the basket, if the authorities appreciate the rupee against sterling at a rate lower than the appreciation of the basket;

(ii) when there is a fall in the value of the basket, if the authorities depreciate the rupee against sterling by a rate larger than the depreciation of the basket; and

(iii) when there is a rise in the value of the basket, if the authorities depreciate the rupee against sterling.

All the above types of adjustment could be undertaken without violating the basic basket rule which provides at present for the margins of ± 5 per cent. In short, the flexibility of the basket system depends on the discretionary use of the large margins.

5.4 How to Classify the Indian Exchange Rate Regime?

There has so far been no indication that the Indian authorities altered the currency basket introduced in September 1975 for the valuation of the rupee, either in the names of currencies or in the relative weighting of the currencies. In a constant-weight basket system the rupee-sterling rate can be expressed in the following functional form:

$$\ln Y = \sum_{i=1}^{n} w_i \ln X_i + u$$

where Y = rupee-sterling rate index

X_i = index of exchange rate of ith basket currency against sterling

w_i = proportional weight of the ith currency in the basket

n = number of currencies in the basket

u = error term representing the margins of the basket

This relationship straightaway follows from our earlier analysis of the Indian basket system in its rigid form. There we showed that, had the Indian authorities kept the value of the rupee in a fixed relationship with the chosen currency basket, it would have led to continuous rupee-sterling adjustments, the magnitude of each would be the average of the proportionate changes in the value of the currencies in the basket against sterling, each one weighted according to the original basket weights. However, because of the discretionary use of the basket margins, the above equation cannot adequately represent the Indian system. The discretionary management of the large band around the central rate cannot be captured by a pure white noise term. Therefore, we may better describe the Indian basket system as determining the rupee-sterling rate in the following way:

$$\ln Y = \sum_{i=1}^{n} w_i \ln X_i + Z + u$$

where Z stands for the sum total of objectives which determine the discretionary operation of the basket margins. This 'Z' factor constitutes the flexibility aspect of the Indian basket system.

What is the most appropriate description of the Indian exchange rate system? Joshi (1984) called it an "adjustable NER-peg" where NER stands for the nominal effective exchange rate. However, the way the system worked since its introduction does not fit well with that description. There have been periods of gradual depreciation of the nominal effective exchange rate of the rupee and recently after 1985 a gradual depreciation of the real effective exchange rate. Besides, the authorities did not undertake any sizeable discrete depreciation of the rupee during the 14-year period of the new exchange rate regime.

The I.M.F. classified the new Indian exchange rate system as a composite currency peg up to 1978 and as a managed floating system thereafter, the change in designation coinciding with the upward revision of the adjustment margins of the system. However, we noted the possibility that the discretionary operation of the basket margins started in 1978 itself, even before the widening of the adjustment margins, which might have been instrumental in increasing rupee's instability. (This is further taken up in Chapter 7 and also in Chapter 10) Notably, the I.M.F. also recognizes the continued basket-based rupee valuation in its Annual Reports on Exchange Arrangements and Exchange Restrictions.

Indian exchange rate system can best be classified as a 'crawling basket peg'. The 'crawling peg' is a fixed exchange rate arrangement with the peg itself gradually adjustable (Vines, 1987, p. 713). As noted by Williamson (1981b, p. 4) such an exchange rate regime can have two versions: one, a 'formula-variant crawling peg' and two, a 'decision-variant crawling peg'. In the case of India, the rupee is still kept in parity with a weighted basket of currencies but that peg is changed in small steps. However, since the Indian system has not laid down any objective rule for the management of the crawl but provides for administrative discretion, it appears appropriate to call the Indian exchange rate system as a 'discretionary crawling basket peg'.

Footnotes: Chapter 5

1. The Reserve Bank middle rate is the average of the buying and selling rates.
2. In fact this is one of the reasons why the I.M.F. decided that there should be a review in every five years in which currency components are reworked as to bring back the original weights or the weights representing original criteria (see I.M.F., 1987, p. 30).
3. For example, the share of sterling in official holdings of foreign exchange reserves of 76 reporting countries declined steadily from 9 per cent in 1970 to 1.5 per cent in 1977. Although this share showed some rise in the 1980s it is still within 3 per cent. See I.M.F. Survey (1978, May 22, p. 154) and also I.M.F. Annual Report, 1987 Appendix Table 1.2 on p. 60.
4. Computed from RBI Bulletin (1988, pp. 29 and 31).
5. Same as Footnote 4.
6. The Reserve Bank discontinued selling forward sterling after the devaluation of the rupee on June 6, 1966. The Bank also stands ready to buy and sell currencies of neighbouring countries (except the Nepalese rupee) as part of the Asian Clearing Union (ACU) arrangement.
7. See Krugman (1984) particularly pp. 265-8 for a theoretical treatment of the emergence of the dollar as a vehicle currency.
8. See also the results of the recent comprehensive survey of the foreign exchange market in London in Bank of England Quarterly Bulletin (1986, pp. 379-82).
9. The presence of margins is consistent with this gap.
10. While speculation is not necessary for stabilization in an administered exchange rate system, there is possibility that speculation is destabilizing in such a system during balance of payments crises by offering a 'one-way

option' to speculators.

11. It is Varghese (1984a) who noted this marked shift in the Bank's strategy of management of the value of the rupee for the first time.

Chapter 6

Costs and Measures of Exchange Rate Instability

6.1 Introduction

As opposed to the argument by the proponents of a flexible exchange rate system[1], the generalized system of floating that came to prevail since March 1973 has been characterized by wide fluctuations in exchange rates. The exchange rate instability that accompanied the new international monetary arrangements has been conceptually categorized into two types: (i) the short-term movements, i.e., variation of exchange rates over relatively short periods of time, daily, weekly, monthly etc., and (ii) the medium-term misalignment, i.e., movement of the exchange rate away from its equilibrium value over a prolonged duration of time.[2] Our concern here and in the subsequent chapters is with the former and we ignore the latter[3] in our study. While there has been wide agreement about the continued short-term volatility of exchange rates of world's major currencies since the floating of these currencies in 1973, and also about the potential costs that short-term exchange rate instability imposes on trade and other international transactions, empirical studies so far have not produced conclusive evidence of damaging effect of such exchange rate instability. (See I.M.F., 1984a; and Gotur, 1985)

There are a number of issues connected with the analysis of the costs of exchange rate volatility and its measurement. We make an attempt below to explore them in the context of a less developed country.

6.2 Costs of Exchange Rate Instability

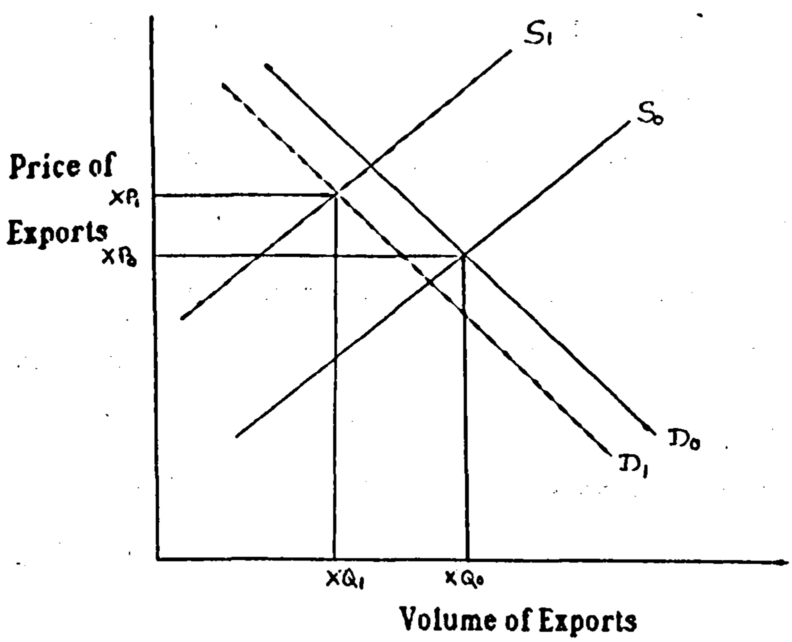
International trade is an ongoing process which involves several stages such as the execution of contracts, procuring of inputs, actual production, shipping of products and finally the settlement of payments and receipts. Just like a firm producing for the domestic market, an international trading firm faces uncertainties in the costs, prices and demand with regard to its products.[4] Under the Bretton Woods par value system, the involvement of foreign currency in international trade did not create any further complication as the rate of conversion between national currencies remained fairly stable within narrow margins. The situation underwent a dramatic change with the onset of fluctuating exchange rates by the addition of yet another element of uncertainty in the decision-making process of the international trading firm.

The cost of exchange rate instability arises from the fact that it generates exchange rate uncertainty. Although exchange rate uncertainty is related to exchange rate instability, it is necessary to distinguish between the two in order to understand fully the costs of exchange rate instability. Instability of the exchange rate by itself is not very damaging if economic agents engaged in international transactions are able fully to anticipate that instability. In fact, it would not be unrealistic to assume that expectations of future exchange rates do enter into the decision-making of international trading firms. Uncertainty creeps in the process as these firms find that the actual exchange rate turns out to be different from what they had expected. The larger the difference between the two, the more costly it becomes for risk-averse traders to go by their present expectations, and that depresses the level of production and commitments to trade.

It is clear from the preceding discussion that an economic agent's perception exchange risk can be considered as an increasing function of his exchange rate expectational errors of the past. It may be noted that this uncertainty effect is applicable both on the supply and demand side of international trade. The commitments to trade both by suppliers and demanders are affected by exchange rate uncertainty. Therefore, the ultimate impact on the quantum and price of trade of exchange rate risk depends on the relative elasticities of demand and supply as well as on the relative shifts in supply and demand arising from the risk factor. This is illustrated below.

Fig. 6.1 represents the market for a typical export product.[5] S_0 and D_0 show

Fig. 6.1 Export Market and Exchange Rate Uncertainty



the supply and demand respectively of exports for the product in the absence of exchange rate uncertainty. XQ_0 and XP_0 are the equilibrium quantity and price in that context. Exchange rate uncertainty leads to backward shifts of both supply and demand curves for the export product indicated by S_1 and D_1 respectively. As a result, the new equilibrium export volume declines from XQ_0 to XQ_1 whereas the price increases from XP_0 to XP_1. It is not necessary that the price should always rise with exchange rate uncertainty; it could also fall. In this particular case, it can be seen from Fig. 6.1 that the price rose because the supply curve shifted more than the demand curve, given equal elasticities for the two curves. The price could fall in the opposite case of a larger shift in the demand curve than the supply curve unless offset by elasticity differences between the two curves.

By emphasizing the costs of exchange rate instability one should not lose sight of the theoretical possibility of a stimulating effect of exchange rate instability on trade. Bailey, Tavlas and Ulan (1987) argue that exchange rate variability also offers additional opportunities for profit and the capability of exploring these opportunities requires specialised knowledge of foreign exchange markets, the possession of which is positively correlated with the volume of trade transactions, and the size of this profit is also positively correlated with the volume of trade. In the context of developed countries the above hypothesis could be valid whereas for LDCs such a possibility is rather remote. This is particularly due to the exchange control regulations existing in LDCs which prohibit speculation on foreign exchange markets by traders.

With the continued existence of exchange rate uncertainty, methods have been introduced to insure the traders against it. Forward market facilities have expanded considerably in recent years in developed countries.[6] However, it may be noted that the presence of forward markets does not alter much the argument about the costs of exchange rate uncertainty. Firstly, the recourse to forward cover imply transaction costs for the trader in the form of forward margin, brokerage fees, etc., which are an increasing function of exchange rate variation and hence reflect the implicit cost of exchange risk in the absence of cover (Bailey et al. 1987, pp. 227-8). Secondly, even if forward markets exist, they remove uncertainty, of course at a cost, only for the current sales of past production. Uncertainty still exists with regard to production for future transactions and such long-term cover facilities may not be available. At the most it can be said that, the existence of forward facilities has reduced the element of uncertainty connected with fluctuating currencies but has not eliminated it fully.

The point above could perhaps be elaborated with the help of the distinction drawn in exchange risk literature between 'transaction risk' and 'economic risk' (see Levi, 1983, pp. 3-4). The transaction risk refers to uncertainty with regard to the future domestic currency realization of a current trade contract denominated in foreign currency. The economic risk refers to uncertainty with regard to the future profitability resulting from changes in domestic currency value of a firm's exports or imports. Whereas the transaction risk of exchange rate can be insured against in the forward markets, the economic risk which is much more important for the trader cannot be protected against through forward markets.[7]

It has been recognized in the literature that the impact of exchange rate instability is more severe in the case of developing country than for developed country traders (see Helleiner, 1981; and Crockett and Goldstein, 1987). The absence or the limited existence of adequate forward marketing facilities is a factor to be reckoned with in LDCs. In addition, foreign exchange controls prevalent in most of these countries rule out the possibility of these countries' traders either resorting to international forward markets or taking recourse to international borrowing as a spot cover for future trade receipts and payments.

Another important matter that needs to be stressed in connection with exchange rate volatility and LDCs, arises from the currency invoicing pattern of their trade which is different from that of the majority of developed countries. Studies by Grassman (1973), Page(1977), and Magee and Rao (1980), among others, showed that the developed country trade is generally denominated in seller's currency. This reduces the currency fluctuation risk faced by exporters in these countries. For developing countries, on the other hand, have their products invoiced either in the developed country buyer's currency or in a third currency which is usually the U.S. dollar and very seldom in their own currency. McKinnon (1979) explains this asymmetry in terms of the predominance of "tradables I", i.e., differentiated manufactured products, in developed country exports for which the seller has the power to fix the price, and of "tradables II", i.e., standardized homogenous primary commodities, in LDC exports for which the seller is largely a price taker. Whatever the theoretical reason for the difference between the invoicing pattern of LDC and developed country exports, the result is that there is a larger exposure of exchange risk for the former as is explained below.

In the context of designation of trade contracts in the partner country's currency, at least the developing country's export demand escapes the exchange risk. However, if exports are denominated in a third country currency like the U.S. dollar, which is the usual case,[8] the LDC exporter is subject to a double exchange risk effect: the first, due to the risk borne by the foreign importer stemming from fluctuations in the importer's currency vis-a-vis the U.S. dollar and the second, due to fluctuations of the LDC currency vis-a-vis the U.S. dollar which is borne by the exporter himself. In short, trade transactions in common currency enhance the exchange risk effect as it results in the imposition of risk on both supply and demand sides.

Now we shall recapitulate the basic argument linking exchange rate instability and trade developed so far. The exchange rate uncertainty created by exchange rate volatility imposes a cost on traders, both exporters and importers. Those who resort to hedging do it at a cost but that frees the trader from uncertainty of exchange rate movements with respect only to the current transaction for which cover has been made and, therefore, he remains unprotected against exchange rate fluctuations which affect his future production and trade transactions. This additional cost created by exchange rate uncertainty makes international trade unattractive in comparison with domestic trade. This is called the"anti-trade bias" generated by exchange rate volatility.

The discussion in the preceding paragraphs assumed that a developing country followed a floating exchange rate system similar to a developed country so that the former's currency moved against the latter's continuously. But that need not be the case. A large number of LDCs have been maintaining a fixed peg with a dominant trading partner's currency. Such single-currency pegs, while freeing the trade between the LDC and the peg-currency partner from exchange risk, could in turn lead to deflection of trade away from other countries whose currencies are fluctuating against the peg-currency, towards the peg-currency country. This, however, defeats the very laudable objective of geographical trade diversification.

Although there exists the possibility of a "trade-diversion" effect of exchange rate instability as explained in the preceding paragraph, empirical studies by Dychter (1979), Greene (1980),and Gupta (1980) did not indicate any evidence in this regard. Helleiner (1981) views the lack of evidence for such an effect of exchange rate instability in LDCs, in terms of the dominance in these countries of other factors over exchange rate uncertainty in the determination of trade patterns such as, the "long-term competitiveness as indicated by changes in real exchange rates, market access, credit availability, multi-national firms' activity in trade, aid flows, national diversification objectives, altered purchasing or marketing practices" (p. 474). This does not, however, mean that the cost of exchange risk has not been high in LDCs, but rather there have been in operation several other factors in these countries which make trade diversion towards the peg-currency country still more costly.

Williamson (1982) makes a distinction between the microeconomic and macroeconomic effects of short-term exchange rate instability. The former is faced by individual traders working through variation in bilateral rates, and the latter felt by the economy as a whole. The macroeconomic impact of exchange rate instability operates in the following manner: exchange rate volatility leads directly to volatility in traded goods prices which is transmitted to the economy as a whole thereby affecting the resource allocation, output and employment. Coes (1981, p. 119) distinguishes between the allocation and production effects of exchange rate uncertainty; the former implies the substitution of domestic market for foreign market, whereas the latter implies an overall decline in domestic output irrespective of markets, domestic or foreign.

We are here not touching upon the various other aspects of the cost of exchange rate instability particularly relevant to LDCs such as the effects on the terms of trade, the strains it imposes on the scarce managerial expertise of LDC monetary authorities in managing the foreign exchange assets and also in managing international debt. These issues are not pursued here, not because they are not important, but because they are not directly relevant to the detailed study undertaken in the subsequent sections of this chapter. Some of these issues are, however, covered in earlier studies (see Helleiner, 1981).

6.3 General Issues on Measurement of Exchange Rate Instability

An ideal measure of exchange rate instability should capture fully the additional costs imposed by it during the period under consideration. While it is virtually impossible to measure exactly the costs of exchange rate volatility, what has been naturally done by researchers in the area is to use the observed variability in exchange rate as the proxy for the uncertainty cost that is incurred on account of exchange rate instability. Before introducing the various measures that have been most commonly used, it would be helpful to sort out some major issues relating to the measurement of exchange rate instability.

6.3.1 Nominal vs. Real Exchange Rates

Perhaps the most lively methodological issue in exchange rate instability studies is concerning whether one should employ volatility of nominal or real exchange rates. Most of the early econometric studies conducted to estimate the link between exchange rate instability and trade, have used nominal exchange rates. The proposal of nominal exchange rate in the measurement of exchange rate instability assumes 'money illusion' on the part of traders. The use of nominal exchange rates in measuring exchange risk is also justifiable if the time gap between the contract to trade and the actual settlement of the transactions is just a few months during which external prices and internal costs may not change considerably and the only source of uncertainty in the transaction is the nominal exchange rate changes. In the case of products which are already produced this could be a good approximation. However, in regard to exports and imports which involve larger gestation period, trader's genuine interest is for the real rather than the nominal exchange rate stability. Thus, to the extent that instability in relative prices are offset by the nominal exchange rate instability, trader's overall uncertainty is reduced.

6.3.2 Which Relative Price to Use?

If it is decided that the real exchange rate variability is the appropriate concern of the trader, the next issue is to choose the relevant prices to convert the nominal exchange rate into real exchange rate. Here, as in many other instances of economic investigation, the theoretically ideal procedures may not be always the practically feasible ones, and so the economic investigator has to settle for the least objectionable. The economically most meaningful relative price for our purpose is the ratio between the prices of domestic tradable goods and the prices of foreign competing goods. In the literature, the real exchange rate is also defined as the ratio of prices of tradables to nontradables. This is based on the "small country" assumption which implies the law of one price for tradables. This, however, is not consistent with the existence of differentiated products in developed country exports and also of quantitative import controls in LDCs (Joshi, 1984, pp. 40-1).

Artus (1978) argues that the relevant relative price should be the relative cost of production of tradable goods rather than their prices, as international competition tends to equalize the tradable goods' prices across countries. Nevertheless, in the case of a developed country producing differentiated products for international exchange, the ratio between the prices of home tradables and foreign tradables reflects the unit cost differences between home country and partner country. This derives from the practice of constant 'mark-up' pricing in modern industry. In the context of many LDCs the point of Artus is more relevant. A large number of these countries specialize in internationally traded homogeneous primary commodities or fairly standardized manufactured products. The forces of competition equalize the prices of these commodities internationally through adjustment in profit margins. With regard to these commodities, what one has to look for is the cost differences which affect the relative profitability. Unit labour costs may be quite relevant for manufacturing firms which are labour-intensive (Willett, 1986, p. S106). Unfortunately, however, unit labour costs let alone unit total costs are not available in many LDC's and, if available, they are not on a frequency less than a year. Therefore, we have to make compromises to arrive at a less satisfactory index for relative costs.

Issues like what constitute tradable goods also remain. Apart from the fact that actual exports and imports compose only part of the tradable goods sector, the unit value indices of exports and imports are not very reliable even for developed countries (Goldstein and Khan, 1985). While GDP deflator is one of the possible candidates, the low frequency and delay involved in its computation rule out its use for the purpose in most cases. Besides, the inclusion of services in GDP makes the GDP deflator not a good representative of tradable goods prices or costs particularly for developing countries.

This leaves the wholesale price index (WPI) and the consumer price index (CPI) as the remaining candidates for the construction of relative price. The WPI is more representative of costs and prices of tradable goods than CPI and it is a better indicator of total costs in the economy than the CPI. The CPI although reflects the labour costs which is important for labour-intensive manufacturing firms, it includes the prices of many nontradable services. Kenen and Rodrik (1984), although agreeing with the superiority of the WPI over the CPI in the calculation of real exchange rate index for the set of developed countries which their study covered, have in fact opted for the CPI on the grounds that it is more comparable across countries.

6.3.3 Bilateral vs Effective Exchange Rate

In the absence of a stable unit of account in the international monetary system, the variation in a currency's exchange rate involve movements against several different currencies at varying rates. This necessitated the definition of an average exchange rate variation. There are two ways in which exchange rate variation can be computed. Either one can find movements in each individual bilateral rate and average them based on an appropriate weighting system, or one can, first of all, compute an effective exchange rate index[9] by averaging the individual bilateral indices on a common base and later obtaining its variation. The former is called the "effective variation" (EV) by Frankal (1975) and the latter is termed the "variability of effective exchange rate" (VEER) (Lanyi and Suss, 1982).

The two types of exchange rate variation mentioned above are not the same. The variability of effective exchange rate (VEER) will be more or less than the effective variation (EV) depending on whether the covariance of individual bilateral rates are positive or negative (Lanyi and Suss, 1982, p. 539). The basic question is which of the two are more relevant for the purpose of measuring the cost of exchange rate variation in a particular country?

The answer to the above-mentioned question depends on firstly, whether we are interested in the economy-wide exchange rate uncertainty or the uncertainty facing individual traders and secondly, whether individual traders of the home country are sufficiently diversified across countries or are tied to particular countries in their trade. In regard to the first criterion, it can be argued that the loss incurred by individual firms trading with high exchange risk markets may be offset by the gain made by firms trading with low risk markets. Regarding the second criterion, it is stated that if traders are reasonably diversified geographically or if there is the possibility of such diversification in the event of high exchange rate uncertainty, then they can switch trade away from high-fluctuation currency areas to low-fluctuation areas. Variability of effective exchange rate takes into account the effect of trade diversification through the variance-covariance matrix. For developed countries where trade is undertaken by large diversified enterprises, variability of effective exchange rate could capture the exchange rate uncertainty (I.M.F., 1984a, p. 10). However, in countries where trade is in the hands of several small and undiversified firms the possibility of the benefit of compensation for exchange rate uncertainty as explained above may not possibly exist, and, therefore, effective variation may be more appropriate in their context. Although in the long run the possibility of diversification and compensation do exist even in developing countries, in the short and medium run the structure of trade is so rigid in these countries that effective variation appears to be more relevant.

Willett (1986) goes a step further with regard to the appropriateness of various measures of exchange rate uncertainty in the context of developed countries. He evokes modern finance theory and argues for an overall measure of diversified risk, rather than just the ones mentioned above, taking into consideration the international portfolio diversification of individual firms. This procedure, no doubt, complicates the measurement of exchange risk. However, as stressed by Willett, the inability of incorporating this aspect in various exchange risk measures could be one reason why many empirical studies on the impact of exchange risk in developed countries did not produce robust results.

6.3.4 Elasticity Weights, Trade Weights or Invoice Weights?

Whether we are measuring the effective variation of bilateral exchange rates or the variation in effective exchange rate, a proper weighting system is necessary to combine the bilateral rates or their individual variations. Here again, in order to settle on the appropriate weights, one has to make a compromise between what is theoretically ideal and what is practically available. Elasticity weighting system would involve distribution of weights among bilateral rates in proportion to the contribution a change in each bilateral rate makes to the overall balance of trade of the home country. Suppose the home country devalues by a uniform extent against the currencies of all its trading partners and its trade balance improves within, say, two or three years, by a given amount in constant dollars. Then the elasticity weight for each partner country is indicated by the ratio between the home country's improvement in balance of trade against that country and that against all trading partners (including that against the specified country).

Conceptually, elasticity weights are ideal in computation of effective exchange rate or effective variation. However, the derivation of these weights are not easy. It involves first, the estimation of the underlying own-price and cross-price elasticities of supply and demand of all products of all countries in a general equilibrium framework. Then, such a multilateral model has to be simulated for a given exchange rate change against all countries for getting the trade balance effects against each country. Such a model has been constructed at the IMF and is called the Multilateral Exchange Rate Model (MERM) and the IMF regularly calculates the effective exchange rate indices of 18 OECD countries based on weights derived from the simulation results of that model.[10]

Although some attempts have been made to construct a MERM for LDCs by incorporating the specific features of these countries,[11] the reliability of such a construct for these countries is questionable in view of its huge data requirements and the accuracy of the data collected for these countries for the purpose. Therefore, more simple alternatives have to be sought and researchers have been employing trade weights for LDCs as a proxy for elasticity weights. This involves giving each trading partner a weight according to its share in total exports and/or imports. The larger the number of countries in the weighting system, the more accurate it will be but in actual practice, a selected number of countries are taken and their weights are normalized to sum to unity.

While using the trade weights instead of elasticity weights in the computation of effective exchange rate or effective variation, one should be aware of the limitations of such a procedure. Firstly, a trade-weighting system assumes that the home country faces identical export and import (supply and demand) elasticities with respect to all its trading partners. Secondly, it is supposed that bilateral exchange rate changes have no implication on third country competition. If there is trade concentration of low-elasticity primary commodities and high-elasticity manufactured products with different trading partners, then the first assumption is unrealistic. To the extent that home country's trading partner imports from or exports to third countries products similar to those the home country exports to or imports from the trading partner, a change in the third country's exchange rate with the trading partner has effect on bilateral trade between home country and the trading partner.

It has been argued that LDCs whose exports are denominated in vehicle currencies like the U.S. dollar, invoice-weighting is more appropriate than trade-weighting (see Lipschitz, 1979; and Helleiner, 1981). But this is not quite a valid argument. Invoicing, no doubt, affects the current domestic currency receipts of past contracts as exchange rate changes vis-a-vis the invoice currency between the time of the trade contract and its actual financial settlement. However, trade is a continuous activity and future prices of LDC exports in vehicle currency will be quickly affected by the exchange rate movements between that currency and the currency of the country to which the country exports. But here one has to remember that the impact on vehicle currency export prices of the trade partner's exchange rate movements vis-a-vis the vehicle currency depends on that country's import share in the global imports of the commodities which the home country exports and not just on the import share of that country in home country exports alone. (Williamson, 1982, pp. 55-7).

In this context, petroleum trade requires a separate treatment as the above-mentioned possibility of the continuous equalization of world prices in dollar terms of primary commodities is not strictly applicable to that commodity. This is so because, the price of oil is not merely designated in dollar but is also determined in dollar through the operation of a producers' cartel. In consequence, exchange rate movements of major currencies against the U.S. dollar do not have perceivable impact on the dollar price of petroleum in international markets. Therefore, it would be more appropriate to augment the weight of the dollar in the calculation of the effective exchange rate or effective variation of bilateral rates to the extent of trade in oil of the home country as if that part of trade is conducted with the U.S.A.[12]

6.3.5 Time Period of Exchange Rate Variation

In fact, there is no single unit of time period which can be said to be the most appropriate for computing exchange rate instability. Traders normally have a continuous stream of payments and receipts and, therefore, are affected by exchange rate movements continuously. While Akhtar and Hilton (1983) used daily exchange rates for computation of exchange rate variation, Hooper and Kohlhagen (1978) employed weekly observations. The use of daily or weekly exchange rates become unwieldly when a long period of data is considered. Besides, when real exchange rates are to be used, the absence of price information on a daily or weekly basis compels the researcher to use only monthly or quarterly data for computing short-term exchange rate volatility.

6.4 Common Measures of Exchange Rate Instability

While a more detailed description of the statistical measures of exchange rate instability has to await the next chapter where we discuss the construction of different measures for analysing the Indian case, we make in this section a general discussion of the measures of exchange rate instability that is commonly used in empirical literature on exchange rate volatility. The purpose of this section is to bring out the comparative merits and demerits of these different statistical measures.

We argued previously that the cost of exchange rate variation arises from the fact that part of it is unexpected. Therefore, each measure of exchange rate instability necessarily involves an expectation formation hypothesis. There are broadly three such measures which are popularly used, each one implying a different exchange rate expectation. They are (i) the standard deviation/coefficient of variation of levels of exchange rates; (ii) the standard deviation of percentage changes in exchange rates; and (iii) the mean of absolute percentage changes in exchange rates. We shall examine each of these one by one.[13]

6.4.1 Standard Deviation/Coefficient of Variation of Levels

The standard deviation of levels and its normalized measure of coefficient of variation are the earliest measures of exchange rate variation (Black, 1976; and Cline, 1976). These measures contained the expectation hypothesis that the expected future exchange rate during any period is given by its actual average. These measures have some obvious drawbacks. Firstly, the standard deviation of levels is a measure of absolute variation which makes it not very reliable for comparison purposes. The coefficient of variation, however, rectifies this problem by expressing the standard deviation as a percentage of the mean. Secondly, the standard deviation of levels as well as the coefficient of variation could lead to incorrect results when the exchange rate series exhibit a long-term trend, either upward or downward. This stems from the fact that the basic assumption in the computation of these measures is that the trend of the series is given by the mean. (Brodsky, 1980, p. 364). This assumption is true only if the series is stationary. If the series is nonstationary, the variance of the series is infinite and the sample variance, although can be computed from such a series, will not be meaningful (Glassman, 1987). This makes the standard deviation of exchange rate levels as well as its related measure of coefficient of variation unreliable as an exchange rate volatility measure.

The basic limitations of the standard deviation of levels as noted above is remedied in another related measure called the standard error of deviations from exponential trend, a measure usually employed in the study of export instability (Brodsky, 1980). Here the hypothesis is that the economic agent's expectations about the future exchange rates are given by its trend, and not by its average value as in the measure of standard deviation of levels. Kenen and Rodrik (1984) use the standard error based on a first order auto-regression equation as an alternative measure of exchange rate instability. Such a measure implies that the expected value of exchange rate is given by "the recent history of the actual rate as portrayed by the autoregressive equation" (p.10).

6.4.2 Standard Deviation of Percentage Changes

The standard deviation of percentage changes of exchange rate differs from the standard deviation of levels of exchange rate or the standard error measures on the underlying assumption of expectations; the latter assumes that traders predict correctly the average level of the exchange rate in the coming period while the former assumes that they predict correctly the average percentage change in future exchange rate. More importantly, the standard deviation of percentage changes is a trend-adjusted measure as it compares actual percentage change in each period with the average percentage change for the period as a whole (Helleiner, 1981, p. 428). Finding first differences (in percentages) usually eliminates the trend in a series by reducing the series to stationarity. This is confirmed by Meese and Singleton (1982) and also Boothe and Glassman (1987) in the case of exchange rates. Therefore, this measure is free from the defects of the earlier measure of standard deviation of levels of exchange rates.

However, the standard deviation of percentage changes as a measure of exchange rate volatility is not free from difficulties. One problem with this measure as noted by Brodsky (1980, p. 367) is that, unlike number of other measures of economic instability, this does not satisfy the decomposition property. That is, for example, if you use the standard deviation of percentage changes as a measure of variation in effective exchange rate, you cannot split up this total variation into variation in the component bilateral rates. This limitation is, however, not a serious problem.

The more serious drawback of the measure of standard deviation of percentage changes as explained by a number of authors such as Farber et al. (1977), Westerfield (1977), and Rana (1981), is that the measure gives a reliable picture of instability only if the underlying statistical series is distributed normally. These authors have demonstrated that in the case of exchange rate changes, the normality property is not satisfied in practice. The problem usually arises when the exchange rate series covers both the adjustable peg period and the floating rate period; in the former period, exchange rate changes are a few but each one of large magnitude whereas in the latter period, they are more frequent but in small magnitude. This dissimilarity of exchange rate movements increases the "kurtosis"[14] of the distribution of the exchange rate series covering both the adjustable peg and floating rate periods to more than three, which is the value for the normal population. Rana (1981) suggests two alternative measures, namely, the scale, which is 44 per cent of an interfractile range, and the Gini's mean difference (GMD) which is the arithmetic average of the absolute differences between all pairs of values in the series.[15]

6.4.3 Mean of Absolute Percentage Changes

Initially the IMF used the standard deviation of percentage changes in its analysis of exchange rate instability (e.g., I.M.F., 1979, p. 42) but it has subsequently switched over to a simple measure, namely, the mean of percentage change, ignoring sign, precisely because of the difficulties with the former measure just mentioned in the preceding paragraph (I.M.F., 1984a, p. 11). But does this alternative measure also incorporate an expectational hypothesis?

We can find a naive expectation model[16] in this simple measure of exchange rate instability, i.e., the economic agents believe that the present value will continue into the future. In other words, the best guess of future exchange rate is given by its present value. Gupta (1980) used a similar measure in his study of exchange rate instability covering five LDCs, and he called the measure the 'mean absolute error'. This measure is admissible only if exchange rates could be characterized by a random walk process with zero drift. When exchange rate follow a random walk process with no drift, the statistical expectation of future exchange rates would be the same as the present rate.[17]

6.4.4 A Comparison of the Statistical Measures

A way of comparison between the different measures of exchange risk is to see the nature of risk aversion incorporated in these measures. Tobin (1958) and Markowitz (1959) who examined the portfolio behaviour of economic agents under conditions of uncertainty, introduced the "mean-variance approach" which identifies risk with rise in both mean and variance (square of standard deviation). This approach assumes quadratic utility functions which as shown by Arrow (1964) and Pratt (1964) requires the condition of increasing absolute risk aversion with wealth or income. As opposed to the mean-variance approach, Rothschild and Stiglitz (1970, 1971) introduced the concept of "mean-preserving spread" in which a distribution is made more risky by transferring some of the observations from the centre to the tails while leaving the mean undisturbed. This methodology can incorporate the intuitively more appealing concept of non-increasing absolute risk aversion. Gupta (1980) and Coes (1981) discarded the standard deviation for measuring exchange rate uncertainty and applied the Rothschild-Stiglitz "mean-preserving spread" in deriving alternative measures

In contrast, Brodsky (1984) and Kenen and Rodrik (1986) recommended the use of standard deviation as a measure of exchange risk on the plea that it is consistent with the hypothesis of risk-averse behaviour of economic decision makers. "Risk aversion is usually modelled by assuming that decision makers maximize objective functions in which unexpected events show up as squared deviations from expected values" says Kenen and Rodrik (p. 311). Standard deviation gives higher weight to larger values and Brodsky finds that aspect particularly attractive and he states, "....studies of portfolio choice under conditions of uncertainty have generally utilized quadratic cost functions thereby effectively giving greater weight to extreme observations" (p. 299).

6.5 Conclusion

The review above indicates that although there is considerable agreement in the literature about the possibility of high costs of exchange rate risk in LDCs there is much less agreement on how to measure the exchange risk. There are several methodological issues involved in the construction of appropriate exchange risk measures and there exists no single perfect measure of exchange risk. The only practical step then for researchers would be to employ more than one measure and see whether they give consistent results. We adopt this strategy in the next chapter where we examine the Indian exchange risk experience in detail.

Footnotes: Chapter 6

1. See for example Friedman (1953) and Johnson (1972).
2. See Crockett and Goldstein (1987, pp. 2-3) for a clear distinction between the two concepts of exchange rate instability.
3. For more details of the costs of medium-term misalignment of exchange rates, see Williamson (1985a) pp. 38-45.
4. There is a large volume of literature on firm's decision-making under price uncertainty. See Coes (1981) for a brief survey and its relevance in the analysis of exchange risk effect.
5. Our reference to exports alone does not imply that imports are unaffected by exchange risk. However, with direct government imports as well as quantitative restrictions on private imports in most LDCs, the measurement of the impact of exchange risk on imports in these countries is difficult.
6. See De Lattre (1985) particularly, pp. 87-89 for a description of the different types of schemes that have emerged to insure the traders against exchange risk uncertainty.
7. It may now be clear from the discussion so far that we do not make the Knightian distinction between risk and uncertainty but use either of the terms to mean the same thing. It may also be noted that, although exchange risk and exchange rate instability (short-term fluctuations) are conceptually separate as made clear in the text, we use them alternatively throughout the thesis to refer to the former.
8. See Black (1985), Table 2.1 on p. 1159.
9. Hirsch and Higgins (1970) were the first to write about the concept of an

effective exchange rate index. The various problems connected with the construction of an appropriate effective exchange rate index were subsequently discussed in Rhomberg (1976) and in Maciejewski (1983).

10. Artus and McGuirk (1981). See also IMF Survey (1982), pp. 37-39, for a simple exposition of the MERM.
11. Feldstein, Goldstein and Schadler (1979) for the MERM-type model of primary producing countries.
12. Joshi applied this principle in constructing an import-weighted effective exchange rate index for India. See pp. 55-6 of Joshi (1984).
13. Please note that the definition of exchange rate uncertainty as the past expectational errors do not come out explicitly in this exposition. This is so because, our attempt in this section is the statistical comparison of the various measures of exchange rate instability and not to bring out the economics of these measures. The economic rationale of the different measures shall be discussed in Chapter 7.
14. Kurtosis of a series is measured as the ratio between the fourth moment about the mean and the square of the second moment about the mean of the distribution.
15. See Rana (1981, 1984) and Brodsky (1984) for details of these measures. See also Boothe and Glassman (1987) for further research on the statistical distribution of exchange rates.
16. Maddala (1988), pp. 338-40 for more details of naive models of expectation.
17. See Pindyck and Rubinfeld (1981, pp. 494-6) for a simple exposition of the random walk process.

Chapter 7

Exchange Rate Instability and the Indian Basket System

7.1 Introduction

We saw in Chapter 4 that the Indian authorities adjusted themselves to the uncertain international monetary developments of the early 1970s by following a sterling peg initially, and that they made a shift to a multi-currency peg subsequently in September 1975. The switch from a sterling peg to a basket system has been prompted by the objective of reducing exchange rate instability. In this chapter we attempt to analyse the Indian experience of exchange rate instability during the last two decades, 1968 to 1987, with a view to assessing the impact of the Indian basket system on exchange rate instability.[1]

7.2 Methodological Issues

As we noted in Chapter 6, there are several methodological issues connected with the construction of an appropriate measure of exchange rate instability. First of all, one has to decide whether the exchange rate volatility has to be measured by nominal or real rates. Although there are strong reasons for employing the real exchange rates rather than the nominal, we consider both nominal and real measures of exchange rate volatility for the following reason. For the monetary authorities, nominal exchange rate constitute the control or instrument variable, the manipulation of which enables them to reach the targeted real exchange rate. It would, therefore, be important to monitor nominal exchange rate variation at the first instance, and then compare it with the real exchange rate variation. This comparison could throw more light on the authorities' exchange rate management. With regard to relative prices, i.e., the ratio of foreign prices to domestic prices, which is used to convert the nominal exchange rate into real, we employ the ratio of foreign and domestic wholesale prices. In the context of India, wholesale price indices are the least objectionable of all the available proxies for the prices of tradable goods. Joshi (1984) also employed the same procedure for constructing India's real exchange rate.

The second issue is to determine the choice between the effective variation, i.e., the average variation of each individual bilateral exchange rates, and the variation of effective exchange rate. We saw in Chapter 6 that the choice mainly depends on the extent of actual/potential trade diversification of individual traders of the country. In the case of Indian exporters, it seems that the assumption of low actual/potential geographical trade dispersion is more appropriate, whereas for Indian imports it does not seem unrealistic to assume a high degree of actual/potential geographical dispersion of trade. This asymmetry stems largely from the fact that while Indian exports are highly decentralized and mostly done by several private participants, a large quantity of Indian imports are arranged through large public sector agencies. Therefore, in the case of Indian exports the switching between markets may not be possible, while it is theoretically possible for

Indian imports. Our concern in this chapter is with the overall exchange rate instability and not with exchange rate instability relevant just to the exports or imports. This in turn necessitates the consideration by us of both the effective variation and variation of the effective exchange rate measures.

The third methodological issue with regard to the construction of exchange rate volatility measures is the choice of an appropriate weighting system. Following the arguments in Chapter 6, we employ a trade-weighting system adjusted for the role of the U.S. dollar in India's oil imports. But it can be argued that exchange rate fluctuations in India affect exports rather than imports as the latter is largely controlled by the government and, therefore, export weights alone are needed. While it is agreed that the impact of exchange rate instability on the volume of imports in India could be negligible in the short run - this arises from the highly inelastic nature of imports in a tightly controlled import regime - it does not mean that there could be no additional costs to the country from the import side on account of exchange rate volatility. Even if the additional costs imposed by exchange rate uncertainty is not passed on to actual consumers immediately by the government or private importers whose profitability is affected by exchange rate volatility, it has implications in the longer term. Therefore, it is more appropriate to have trade weights rather than just export weights for the computation of the costs of exchange rate uncertainty in India.

Finally, we have to decide on the appropriate periodicity for the exchange rate volatility measure. We consider a month as a reasonable unit of period, and employ the period average of exchange rates for the purpose rather than the end-of-the-month rates. This averaging process in fact underestimates the actual volatility but we use that data in order to maintain consistency with the price data which is available only on a monthly average basis.[2]

7.3 Definition of Various Measures of Exchange Risk

We argued in Chapter 6 that the best way to measure the exchange risk of an economic agent is to find out his past expectational errors relating to exchange rates. In order to proceed that way one needs to know how the economic agent forms his exchange rate expectations. Modelling of the economic agent's exchange rate expectations is ideal to the exercise. This in turn requires a model of exchange rate determination, which the economic agent can use to forecast the future evolution of exchange rates. Surveys on exchange rate modelling in developed countries (e.g., Israd, 1987) indicate an unsatisfactory state of affairs. While it has not been possible to formulate an appropriate exchange rate model for a developed country, such an attempt is meaningless for LDCs like India where exchange rate system is officially managed. Therefore, we have not undertaken any exercise to generate exchange rate expectations based on any formal exchange rate model for India. Instead, we followed a more simple and straightforward approach which is not inconsistent with previous empirical studies in the area. We define below three basic statistical measures that are considered in the construction of exchange risk proxies for India with a view to bring out fully the economic logic of each measure.

All measures of exchange risk, as noted above, are measures of deviation of actuals from expected exchange rates and, therefore, require considerations relating to economic agents' prediction of future exchange rate. The knowledge of future, however, assumes forward-looking expectations and hence, in a limited sense, these measures draws from issues raised by the "rational expectations hypothesis" originally proposed by Muth (1961).

7.3.1 Moving Standard Deviation of Percentage Changes

The first basic measure of exchange rate uncertainty is derived from the idea that the best guess of an economic decision maker's future exchange rate is given by the trend based on its actual percentage changes. Here the exchange risk for the economic agent in any particular month is computed as the standard deviation of percentage changes of exchange rates for the preceding 12-month period. The formula for this exchange rate uncertainty measure for the current month, t, is given as:

$$EU_t = \sqrt{\frac{1}{11} \sum_{k=1}^{12} (\dot{e}_{jt-k} - \bar{\dot{e}}_j)^2}$$

where e_{jt} = exchange rate in the current month (domestic currency units per foreign currency)

$$\dot{e}_{jt} = \left(\frac{e_{jt} - e_{jt-1}}{e_{jt-1}}\right) 100$$

$$\bar{\dot{e}}_j = \frac{1}{12} \sum_{k=1}^{12} \dot{e}_{jt-k}$$

This measure assumes a period of one year for formation of exchange rate expectations. In other words, the economic agent has a time horizon which is larger than the immediate short period of say, a quarter, that is relevant for just one trade transaction. One year is admittedly arbitrary and may well be shorter than that is appropriate for an international trading firm. However, one could argue that the high volatility of exchange rate movements has the effect of cutting short the period for which the firm forms exchange rate expectations.

The exchange rate uncertainty that is assumed to influence the decision of a trader in any particular month is derived as a function of the difference between the actual and expected exchange rate for the previous 12-month period. This is what is implied by the standard deviation procedure: the larger the gap between the actual and the expected during the past 12-month period as measured by the standard deviation, the larger will be the perceived exchange risk for the trader in the current month.

7.3.2 Moving Mean of Absolute Percentage Changes

The second basic measure of exchange rate uncertainty considered is based on the notion that, the economic agent's best guess of future exchange rate is given by the present rate. However, here we assume that the economic agent forms expectations for a period not longer than a month ahead, unlike in the first basic measure where expectations were assumed to be formed for a full year ahead. Nevertheless, the exchange rate uncertainty pertaining to each month is computed as the arithmetic mean of absolute percentage changes of exchange rates for the previous 12 months. Thus, this measure takes into account the average expectational errors of the previous 12-month period as influencing the trade behaviour of the economic decision maker in the current month. The formula for this measure for the current month, t, is given by:

$$EU_t = \frac{1}{12} \sum_{k=1}^{12} |\dot{e}_{jt-k}|$$

where

$$\dot{e}_{jt} = \left(\frac{e_{jt} - e_{jt-1}}{e_{jt-1}}\right) 100$$

and $|\ |$ stands for discarding sign

As we noted in Chapter 6, this measure involves a naive model of expectations. Gupta (1980) employed a similar measure in the study of exchange rate instability in India and a few other developing countries.

7.3.3 Moving Coefficient of Variation of Levels

The third statistical measure of exchange rate uncertainty we consider, relies on the hypothesis that, the best guess of an economic agent's future exchange rate in the coming year is given by its monthly average for that period. Therefore, the measure of exchange rate uncertainty for any month is computed as the standard deviation of exchange rate levels pertaining to the preceding 12-month period. The formula for this measure in any month, t, is given by:

$$EU_t = \sqrt{\frac{1}{11} \sum_{k=1}^{12} (e_{jt-k} - \bar{e}_j)^2}$$

where e_{jt} = exchange rate in the current month (domestic currency units per foreign currency)

$$\bar{e}_j = \frac{1}{12} \sum_{k=1}^{12} e_{jt-k}$$

As the above measure is not scale free and, therefore, not reliable for comparison, we divide it by the arithmetic mean to derive the co-efficient of variation in the following way:

$$EU_t = \left[\frac{\sqrt{\frac{1}{11} \sum_{k=1}^{12} (e_{jt-k} - \bar{e}_j)^2}}{\bar{e}_j} \right] 100$$

It appears that the third measure described above resembles closely the first one; whereas the first basic measure of exchange rate uncertainty is based on percentage changes in exchange rate, the third measure is based on exchange rate levels. Apparently one cannot choose between the two and in fact the third measure is intuitively more appealing than the first. However, recalling the discussion in Chapter 6, we know that the first measure is superior to the third. This is so because most of the economic series are non-stationary whereas its first difference is stationary. Nonstationary series has the statistical property that their variance is infinite. Although the sample variance is finite, it could give misleading results. Therefore, the standard deviation of levels or its normalized measure of coefficient of variation of levels is not a reliable measure of exchange rate instability. On the other hand, the standard deviation of percentage changes do not suffer from this drawback and, therefore, is superior as a measure of exchange rate instability.

7.3.4 Choice of Appropriate Exchange Risk Measures

Corresponding to each one of the basic statistical measures explained above, one can formulate four different versions, two nominal and two real. They are (1) nominal effective variation; (2) variation of nominal effective exchange rate; (3) real effective variation; and (4) variation of real effective exchange rate. However, in the light of the drawbacks of the measure of the coefficient of variation of levels discussed above, we decide against making use of that basic measure.[3] Therefore, we are left with altogether eight measures divided equally between nominal and real ones. We formally define, first of all, the nominal measures. The first two nominal effective variation measures for any month, t, are

$$NEV1_t = \sum_{j=1}^{n} w_j \sqrt{\frac{1}{11} \sum_{k=1}^{12} (\dot{e}_{jt-k} - \bar{\dot{e}}_j)^2}$$

$$NEV2_t = \sum_{j=1}^{n} w_j \left(\frac{1}{12} \sum_{k=1}^{12} | \dot{e}_{jt-k} | \right)$$

where w_j = trade-weight given to the jth foreign currency ($\sum_{j=1}^{n} w_j = 1$);
n = number of foreign currencies;
and all other symbols are as explained before.

In order to derive the measures of variation of nominal effective exchange rate, we first define the nominal effective exchange rate for any month, t, as:

$$E_t = \prod_{j=1}^{n} e_j^{w_j}$$

where e_j and w_j are the same as indicated earlier.

The two measures of variation of nominal effective exchange rate are given by:

$$VNEER1_t = \sqrt{\frac{1}{11}\sum_{k=1}^{12}(\dot{E}_{t-k} - \bar{\dot{E}})^2}$$

$$VNEER2_t = \frac{1}{12}\sum_{k=1}^{12}|\dot{E}_{t-k}|$$

where $$\dot{E}_t = \left(\frac{E_t - E_{t-1}}{E_{t-1}}\right) 100$$

$$\bar{\dot{E}} = \frac{1}{12}\sum_{k=1}^{12}\dot{E}_{t-k}$$

Similarly, we could define the four real exchange rate volatility measures by using real bilateral rates (i.e., nominal bilateral rate multiplied by the ratio of foreign to domestic wholesale prices) instead of nominal bilateral rates. Thus we define $REV1_t$ and $REV2_t$ as the real effective variation measures which corresponds to the nominal effective variation measures in the same order. Finally, we define $VREER1_t$ and $VREER2_t$ as the two measures of variation of real effective exchange rate which also correspond to the respective measures of variation of nominal effective exchange rate.

It could very well be argued that yet another statistical instability measure which does not have the drawback of the standard deviation/coefficient of variation of levels, namely, the standard error of deviations from a trend equation could also be considered. In fact, Brodsky (1980) has shown that such a measure satisfies the statistical decomposition property. This measure has also been used by some earlier writers (see Helleiner, 1981; and Brodsky and Sampson, 1984). However, besides computational difficulty - it would involve in our case the estimation of a trend equation for every month based on previous 12 monthly observations - there is now evidence that such a method would be improper. Nelson and Plosser (1982) have demonstrated with the help of the U.S. data that most of the economic time series are 'difference stationary' rather than 'trend-stationary'. This buttresses the case for the use of standard deviation of percentage changes against the use of standard error around the trend as a measure of exchange rate instability.

7.4 Data Construction and Sources

The first major task in the construction of exchange risk measures is to set up a currency weighting system. In order to derive the currency weights for India we have to, first of all, decide on the number of bilateral exchange rates which are the most important for the country's international transactiions. We have chosen currencies of eleven major industrial countries which together constituted on the average 52 per cent of India's total visible trade with the convertible currency area[4] during the three year period, 1979-81. According to the RBI Bulletin (1988), about 78 per cent of India's merchandise trade (exports plus imports) had been invoiced in these eleven currencies during the financial years 1979-80 to 1981-82.[5] However, as emerged from the discussion in Chapter 6, the weighting of each currency in the calculation of exchange rate variation is not to be on the currency-invoicing pattern but on the 'direction-of-trade' basis with appropriate correction for oil trade, the price of which is fixed in U.S. dollars. Therefore, we have given weights to these currencies in proportion to the corresponding countries' shares in India's trade during 1979-81, but with augmented weighting for the U.S. dollar in proportion to India's imports from five major oil producing countries (i.e.,.Iran, Iraq, Kuwait, Saudi Arabia and United Arab Emirates) which are predominantly crude oil. The resulting currency weights normalized to add up to unity are given in Table 7.1 on the next page. For the purpose of comparison, we have also indicated the pure trade weights and the invoice weights in a similar fashion in the same table.

It may be noted from Table 7.1 that, the weight of the dollar in the modified trade-weighting procedure described above is almost the double that in the pure trade- weighting procedure (as adjustment is made for the pricing of oil in dollar) and it nearly triples on the basis of trade invoicing. Another interesting aspect of India's trade that is brought out in the table, is the negligible role of all currencies other than the U.S. dollar, pound sterling and the Deutsche mark, in the invoicing of India's trade.

Table 7.1

Alternative Weighting Systems for India's Exchange Rate Calculation Involving 11 Major Currencies

Currency	Modified trade weights[a]	Pure trade weights[a]	Invoice weights[b]
1. U.S. dollar	.445	.250	.727
2. Japanese yen	.121	.164	.024
3. Pound sterling	.109	.148	.130
4. Deutsche mark	.099	.134	.052
5. Italian lire	.035	.048	.007[c]
6. Dutch guilder	.034	.046	.006[c]
7. French franc	.037	.050	.017
8. Belgium franc	.046	.062	.013
9. Australian dollar	.024	.032	.005[c]
10. Canadian dollar	.031	.041	.009[c]
11. Swiss franc	.019	.025	.010
Total	1.000	1.000	1.000

a. The difference between pure trade weights and modified trade weights is that the former is the 'direction-of-trade' weights for 1979-81 and the latter adjusts the former by amalgamating the weight of India's imports from five major oil exporting countries with the U.S. dollar. See text for explanation of this procedure. The raw data for these weights are from IMF's Direction of Trade Statistics, Yearbook, Washington, 1986.

b. Based on data from RBI Bulletin (1988)

c. Residual invoicing share is allocated in proportion to the share of the respective country in India's total trade with these 11 countries.

The basic source of data for the construction of the different measures of exchange rate uncertainty for India is the International Monetary Fund (IMF). The particular series of data employed in this study are indicated below with their source.

(i) Bilateral exchange rates: We collected monthly dollar rates of the rupee and ten major currencies from the IMF's International Financial Statistics (IFS), Supplement Series on Exchange Rates, 1981 and 1985 and also from recent monthly issues of IFS. These rates are the period averages (average of daily rates) shown as 'af' series in the IFS. The ten dollar rates are converted into rupee rates by using cross rates as shown below.

$$e_j = \frac{e_i}{e_{jus}}$$

where e_j = rupee rate of j^{th} currency (units of rupee per j^{th} currency)

e_i = rupee rate of U.S. dollar (units of rupee per U.S. dollar)

e_{jus} = dollar rate of j^{th} currency (units of j^{th} currency per U.S. dollar)[6]

(ii) Wholesale prices: The basic data on wholesale prices of India and the other eleven countries are taken from IMF's IFS, Supplementary Series on Price Statistics, 1981 and 1986 and also various monthly issues of IFS (line 63).

(iii) Trade Data: The data on export and import shares of the eleven countries in India's aggregate trade required in the construction of trade weights are compiled from IMF's Direction of Trade Statistics (DOTS), Yearbook, 1986.

7.5 Previous Empirical Studies

Before going into details of the present work on the rupee's exchange rate instability, it would be useful to mention the important past similar studies on India. A number of studies on developing country exchange rate experiences included India as one among the countries covered [see Black (1976), Crockett and Nsouli (1977), Gupta (1980), Helleiner (1981), Rana (1981), Lanyi and Suss (1982), and Bautista (1981, 1982)]. A limitation of these common studies is that they focus on 'pre-float post-float' comparisons and, therefore, do not take into account the specific forms of exchange rate systems adopted by individual countries in the floating period like the Indian basket peg.

A study by Lipschitz (1979), however, took the Indian basket peg for illustration and examined the impact the basket system had on rupee's stability. The study undertook comparison between two periods, 1973 II-1978 II, and 1975 IV-1978 II, the former a longer one which included the pre-basket period and the initial years of the basket peg and the latter only the basket period. Based on the measure of variance (i.e., square of standard deviation), the study demonstrated that the new exchange regime had led to a substantial reduction in the instability of India's major bilateral exchange rates (nominal) as well as the rupee's nominal and real effective exchange rates. The author, therefore, concluded, "the Indian experiment with a basket peg must be regarded as a notable success in achieving exchange rate stability" (p. 443).

Varghese (1984a, 1984b) made a more comprehensive study of India's basket system. In analysing short-run exchange rate instability, the author concentrated on a few major bilateral exchange rates (nominal). The study employed only one basic measure of exchange rate instability, i.e., the mean of absolute percentage changes of observed bilateral rates, but computed four variants of the same measure based on (i) month-end rates (ii) quarter-end rates (iii) monthly period average rates and (iv) quarterly period average rates. A major conclusion of the study which covered 13 years from 1971 through 1983 is that the volatility of the bilateral exchange rates of the rupee "continued to remain large after the basket link of the rupee in 1975, as was during the pre-basket years" (1984a, p. 1103).

We examine the stability effect of the Indian basket system in the background of the mutually contradictory results of those two previous studies. Our study covers a much longer period of 20 years starting from 1968 and extending up to 1987. Besides, it examines the exchange rate variation in a more exhaustive way. Thus, we consider both nominal and real effective variation which include eleven important bilateral rates of the rupee. The analysis of the variabilility of a few bilateral rates as the previous studies did, cannot produce conclusive results unless we combine them through an appropriate weighting procedure and thereby obtain an average variation. Our study precisely does that. In addition, the present work computes variation in both nominal and real effective exchange rates of the rupee, which adjust the variation of bilateral rates for the covariation between bilateral rates. As we have stressed earlier, the individual traders are interested in effective variation although the variation of effective exchange rate is the concern of the economy as a whole.

7.6 Results of Present Study

In the presence of eight different measures of exchange rate volatility it becomes somewhat tedious to draw a clear conclusion from these results. So, first of all, we attempt a general comparison of the results from the various exchange risk measures before focussing on the results from any particular measure or group of measures.

7.6.1 Results from Various Exchange Risk Measures - A General Analysis

Table 7.2 exhibits the correlation between the annual averages of the different exchange risk proxies we have constructed for India for the period 1968-87. We can compare the results from these measures in three meaningful ways: one, between the basic statistical measures, i.e., standard

Table 7.2: Correlation Matrix for the Various Trade-weighted (Modified) Exchange Risk Proxies (Sample Period: 1968-87)[a]

	NEV1	NEV2	VNEER1	VNEER2	REV1	REV2	VREER1	VREER2
NEV1	1							
NEV2	.97	1						
VNEER1	.86	.75	1					
VNEER2	.89	.91	.82	1				
REV1	.58	.52	.48	.46	1			
REV2	.70	.68	.58	.62	.93	1		
VREER1	.24	.16	.34	.17	.84	.74	1	
VREER2	.42	.34	.46	.37	.84	.87	.86	1

a. Each exchange risk measure has been computed on a month by month moving basis making use of observations in the preceding 12-month period and averaged for each calender year. See text under Section 7.3 for the details of computation of each measure on a monthly basis.

deviation of percentage changes (S.D% CH. for short) versus mean of absolute percentage changes (MEAN ABS % CH. for short); two, effective variation versus variation in effective exchange rate; and three, nominal versus real measures. This three-way classification of the results from the various exchange rate volatility measures reveals that they are highly correlated with regard to the first two methods of comparison, whereas they are not in the remaining method. More explicitly, we find that the results from S.D % CH and MEAN ABS % CH measures move very closely (the correlation coefficient ranges from .82 to .97) and so the results from the measures of effective variation and variation of effective exchange rate (the correlation coefficient ranges from .84 to .91), but the results from nominal and real measures do not exhibit much correlation (the correlation coefficient ranges from .34 to .68). This in turn implies that in the Indian case, the nominal exchange rate instability of a given magnitude does not necessarily generate a predictable magnitude of real exchange rate instability.

This lack of uniformity in the pattern of nominal and real exchange rate volatility noted above in the Indian context has important implication. It is the real exchange rate stability that is desirable. Nominal exchange rate variation that compensates for relative price variation and thereby stabilizes real exchange rate is quite consistent with the goal of exchange rate stability. This point has to be borne in mind in our assessment of the impact of the Indian basket system.

Figs. 7.1 to 7.4 give the graphing of the results from the various exchange risk measures (again on an annual monthly average basis). It may be noted that each graph depicts just one concept of exchange risk but measures it through the two basic statistical formula, i.e., S.D % CH and MEAN ABS % CH. A glance at these graphs confirms our preliminary observations above, i.e., the

FIG. 7.1 NOMINAL EFFECTIVE VARIATION

OF RUPEE, 1968-87

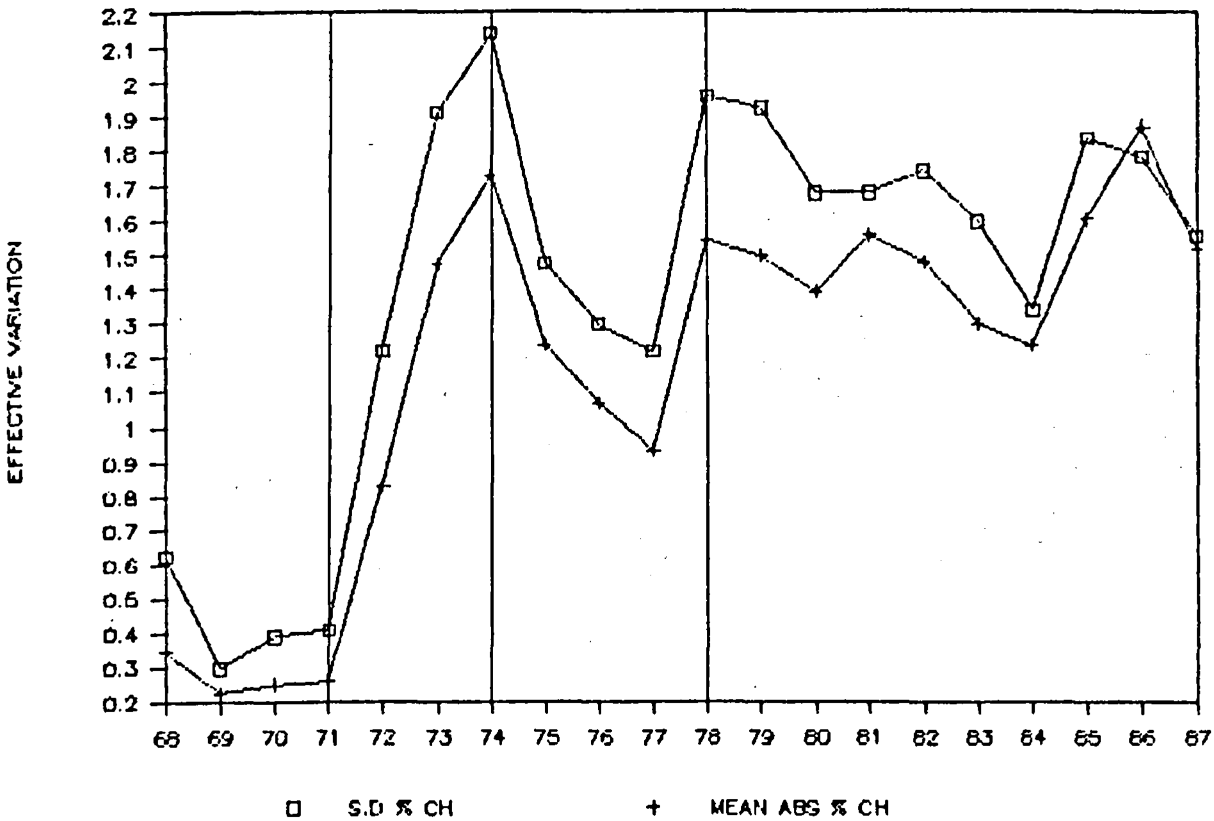


FIG. 7.2 VARIATION OF NOMINAL EFFECT-

IVE EXCHANGE RATE OF RUPEE, 1968-87

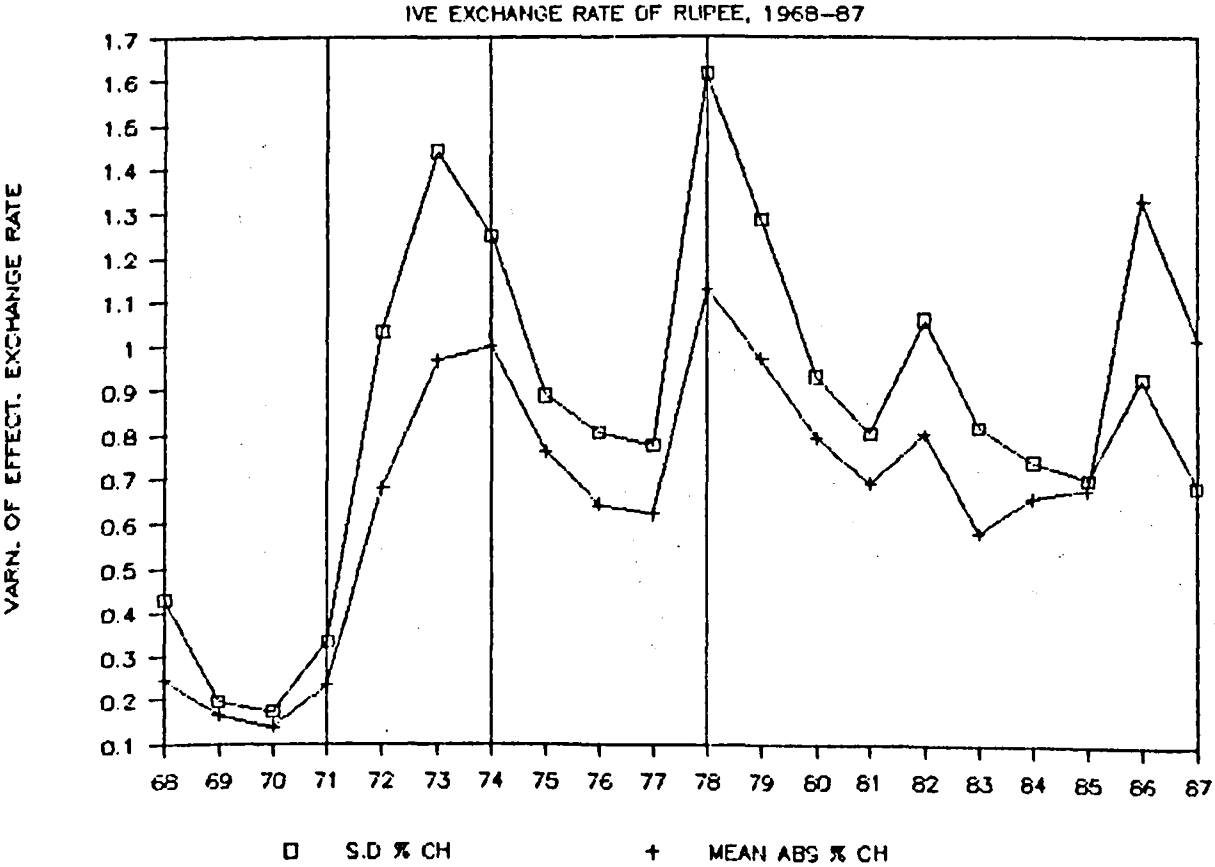


FIG. 7.3 REAL EFFECTIVE VARIATION OF

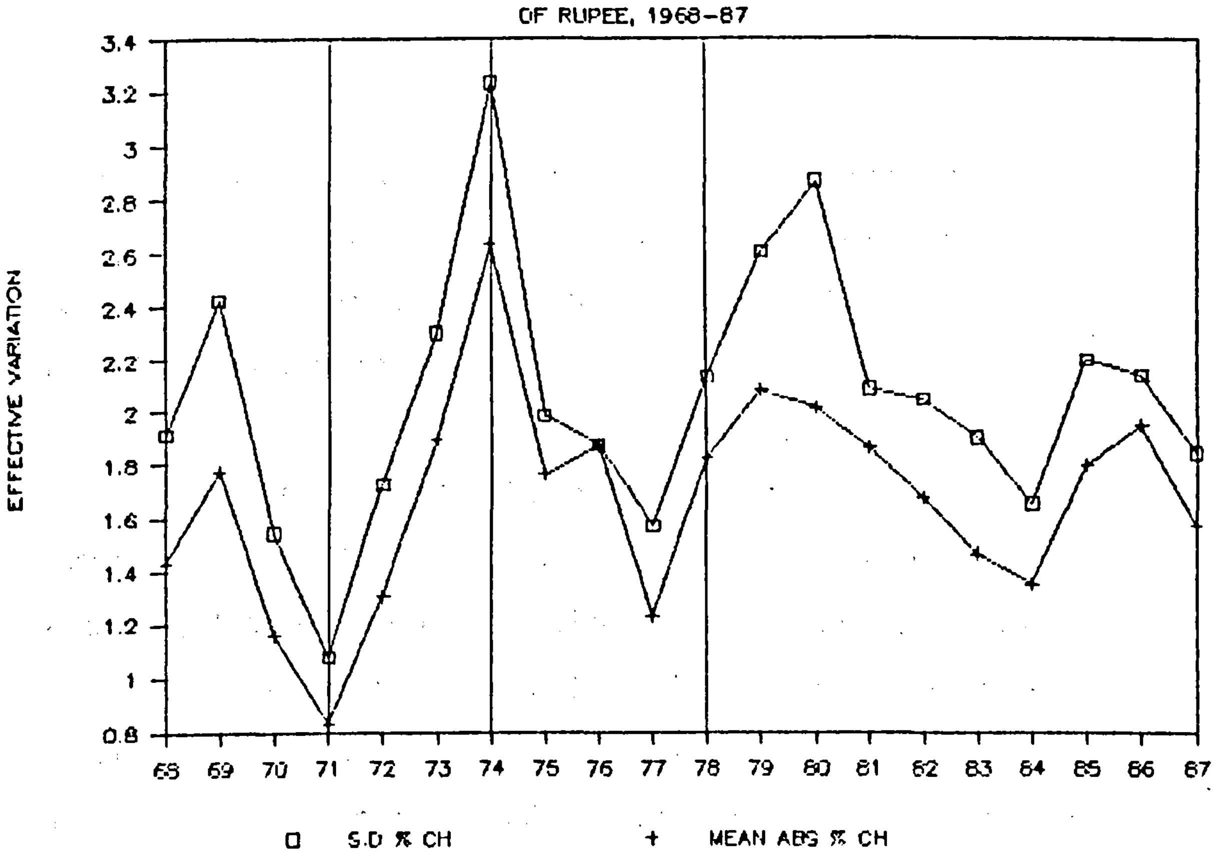
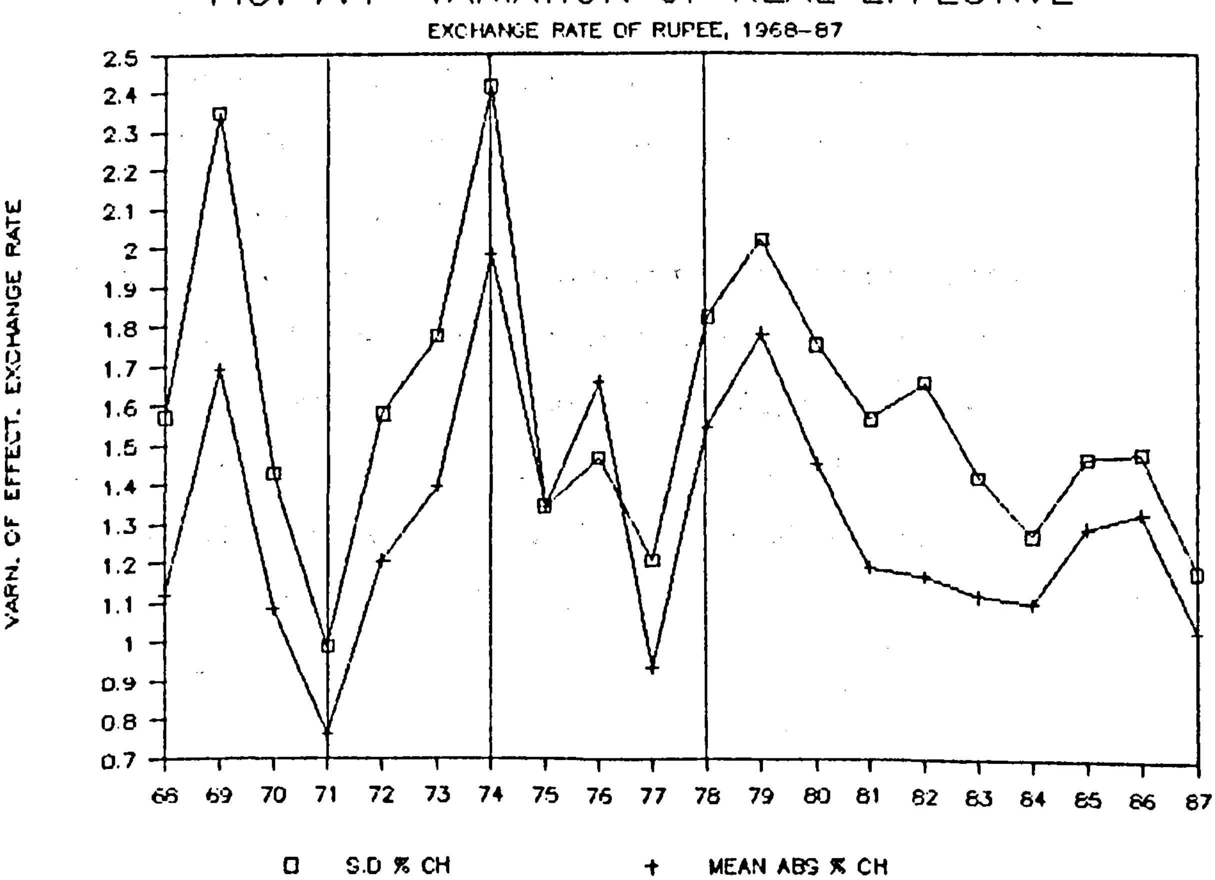


FIG. 7.4 VARIATION OF REAL EFFECTIVE



two statistical formulae give very similar results of exchange rate instability. the effective variation and the variation of effective exchange rate of the rupee also show similar trends, but movements in nominal and real exchange rate instability are not very close.

Now we have to move on to a deeper analysis of the Indian experience in exchange rate volatility keeping in mind the question we raised at the beginning of this chapter, i.e., how did the Indian basket peg perform vis-a-vis its objective of exchange rate stabilization? Although our main thrust is on 'pre-basket versus post-basket' analysis it would be helpful to keep in mind at least four different phases in India's exchange rate regime during the 20-year period of our study.[7]

(i) January 1968 to June 1972: This corresponds to the last phase of the Bretton Woods adjustable peg system;

(ii) July 1972 to September1975: During this period India followed a 'floating' sterling peg;

(iii) October 1975 to January 1979: This can be termed the first phase of India's basket system during which the authorities restricted the margins for the operation of the system to $\pm$ 2.25 percent; and

(iv) February 1979 to December 1987: During this period the Indian basket system became more flexible with the widening of the adjustment margins to $\pm$ 5 per cent.

As the graphs (Figs. 7.1 to 7.4) are drawn on a calendar year basis we cannot clearly distinguish the results between the above sub-periods from them. However, we have drawn lines in these graphs which broadly demarcate these four phases.

7.6.2 Rupee's Effective Variation, Nominal vs. Real

Let us first concentrate on bilateral exchange rate instability, i.e., effective variation, nominal versus real. Fig. 7.1 allows us to view rupee's nominal effective variation measured by both S.D % CH and MEAN ABS % CH measures. As expected, nominal effective variation had been marginal during 1968-71 which corresponds to the last phase of Bretton Woods adjustable peg system. In the next phase, when the rupee followed a sterling peg, effective variation in nominal terms rose very high. The high level of instability was brought down considerably during 1975-1977 which reflects the impact of the introduction of the basket peg. However, rupee's nominal effective variation worsened in 1978, almost a year before the widening of the margins of the basket peg and the instability remained at a high level thereafter up to 1987, the last year of our study.

Table 7.3 on the next page reproduces the nominal effective variation of the rupee in numbers and compares it with its real effective variation. It may be noted that Table 7.3 does not follow strictly the periodization which we laid down earlier. The difference is that, the third period, i.e., the initial phase of the basket peg, is cut short to October '75-December '77 as it is only during this short period after the introduction of the basket peg, that we could notice a significant drop in effective variation. We, therefore, combined the remaining part of the initial phase of the basket peg with the final sub-period. This, we believe, gives a more clear picture of the situation.

Table 7.3 Nominal and Real Effective Variation of Rupee by Different Sub-periods during 1968-87[a]

Type of Instability Measure	Sub-period			
	Jan.68 to Jun.72	Jul.72 to Sept.75	Oct.75 to Dec.77	Jan.78 to Dec.87
A. Nominal Effective Variation (NEV)				
1. S.D. % CH	.476	1.816	1.294	1.706
2. MEAN ABS % CH	.306	1.421	1.038	1.495
B. Real Effective Variation (REV)				
1. S.D % CH	1.721	2.468	1.723	2.146
2. MEAN ABS % CH	1.290	2.018	1.566	1.757

a. All measures are computed on a monthly moving basis, making use of the previous 12 monthly observations, and then averaged for the various sub-periods. See text (Section 7.3) for the computational details of each of these measures on a month by month basis.

The picture that emerges from Table 7.3 is that although rupee's nominal effective variation had been brought down by slightly more than a quarter from July '72-September '75 to October '75 - December '77, i.e., from 1.8 to 1.3 by S.D % CH measure and 1.4 to 1.0 by MEAN ABS % CH measure, the instability rose during the next decade and reached an average level which has been only marginally lower than that during the sterling peg by S.D % CH measure, i.e., it has been 1.7 during January '78-December '87 against 1.8 during July '72-September '75. The nominal effective variation during the last decade has been worse by the alternative measure, i.e. according to MEAN ABS % CH, the variation during January '78-December '87 at 1.5 has been in fact a little higher than that during July '72-September '75 at 1.4.

Turning to the measure of real effective variation, the first comment to make is relating to its value in comparison with the nominal effective variation. By both statistical measures, the real effective variation has been larger than the nominal effective variation. More importantly, we notice a sharper relative difference between nominal and real effective variation during the adjustable peg period than during the rest of the period. That is, as can be made out from Table 7.3, while during January '68-June '72 the real effective variation had been larger than the nominal effective variation by a factor of about four by both statistical measures, it has been higher by a factor of a maximum of one and a half thereafter. Another important fact is that we could find no significant change in this relation between nominal and real effective variation as between the sterling peg and the basket peg regimes.

The finding that the relationship between the nominal and real effective variation in India remained more or less intact throughout the post-Bretton Woods period is significant. During this period India faced not only the two external oil shocks but was also subject to adverse agricultural supply shocks almost coinciding with the external shocks. As a result, inflation in India reached levels much higher than those in the world economy. In spite of this development, if the relationship between the nominal and real effective variation of the rupee remained fairly stable, then that would imply that part of the nominal exchange rate variation had gone towards offsetting the relative price variation and, therefore, had been beneficial. (Recall from earlier analysis that rupee's nominal effective variation remained high during the entire post-Bretton Woods period except during Oct. '75-Dec. '77). This advantage would not have readily been possible during the adjustable peg period when countries kept their nominal exchange rates stable by rule. This has been amply illustrated in the Indian case during 1968-71 when real effective variation had been about four times the nominal effective variation.

What about the comparative performance between the basket peg and the sterling peg with respect to real effective variation? Table 7.3 brings out that, like nominal effective variation, real effective variation also rose after a temporary dip for the first two-and-a-quarter of years of the basket peg. However, it is important to notice that the rise in real effective variation after December 1977 has been much less marked than the rise in nominal effective variation. Thus, the average level of real effective variation during January

'78-December '87 has been about 10-15 per cent lower than its average level during the sterling peg period, i.e., July '72-September '75. This is in contrast to the behaviour of nominal effective variation in the last decade, where it remained nearly equal (marginally lower by S.D % CH and marginally higher by MEAN ABS % CH) to the level during the sterling peg, as we saw earlier.

7.6.3 Variation of Effective Exchange Rate, Nominal vs. Real.

We now turn from effective variation to variation of effective exchange rate. Table 7.4 brings up the picture of variation of rupee's effective exchange rate, nominal as well as real, in a similar fashion as we had for the effective variation in Table 7.3.

Table 7.4 Variation of the Effective Exchange Rate of Rupee by Different Sub-periods during 1968-87[a]

Type of Instability Measure	Sub-period			
	Jan.68 to Jun.72	Jul.72 to Sept.75	Oct. 75 to Dec.77	Jan.78 to Dec.87
A. Variation of Nominal Effective Exchange Rate (VNEER)				
1. S.D % CH	322	1.237	.820	.956
2. MEAN ABS % CH	.225	.905	.665	.864
B. Variation of Real Effective Exchange Rate(VREER)				
1. S.D % CH	1.572	1.881	1.304	1.563
2. MEAN ABS % CH	1.161	1.544	1.304	1.299

a As in Table 7.3 footnote.

A comparison of Table 7.4 with Table 7.3, first of all, indicates that the variation of effective exchange rate has been invariably lower than the effective variation. This has been so for both nominal and real cases. The explanation for the lower value of the variation of effective exchange rate than the effective variation is the negative covariation between the different bilateral exchange rates, i.e., the variation in rupee's bilateral rates has been, to some extent, mutually cancelling. With a closer look at Tables 7.3 and 7.4 we can make out that the negative covariation has been relatively larger for the nominal than for the real bilateral rates. This is implied from the fact that the ratio of the variation in effective exchange rate to effective variation is lower in the case of nominal variation than for the real. This is not unexpected as there could be much more similarity of movements in inflation rates of India's major trading partners than that in their nominal exchange rates. In other words, we expect inflation rates of the major industrial countries which are India's important trading partners to converge more than their bilateral exchange rates.

Another interesting finding relating to the covariation between bilateral rates is that the partial offsetting of the instablity in nominal bilateral rates has been larger during the last decade than during any time in the past. As a consequence, there should have been a better outcome of exchange rate stability in the last decade as recorded by the variation of nominal effective exchange rate than that recorded by its counterpart measure of effective variation. This is explained below.

We noted in the earlier description of effective variation that the nominal effective variation had been brought down significantly only during the first two-and-a quarter years of the basket peg, and in the subsequent period, the instability aggravated and remained at a high level almost equal to that during the sterling peg regime. The picture is somewhat different when we follow the variation in nominal effective exchange rate. The nominal effective exchange rate variation dropped by a quarter to one third from the average level of the sterling peg period in the first two-and-a-quarter years of the basket peg (the drop was one third by S.D % CH and a quarter by MEAN ABS % CH). Thereafter, although the variation in nominal effective exchange rate rose, its average level during January '78-December '87 has been well below that during the sterling peg; it has been lower by a quarter by S.D % CH but lower by only 5 per cent by MEAN ABS % CH.

Now let us move on to the analysis of the variation of rupee's real effective exchange rate. First of all, we see from Table 7.4 that, the variation of real effective exchange rate of the rupee had been quite substantial in comparison with the variation in nominal effective exchange rate in the adjustable peg period of January '68-June '72; it was higher by a factor of five. However, this factor came down to within the range of one-and-a-half to two during the rest of the period. This is almost similar to the results of rupee's effective variation, where we saw that the ratio between real and nominal variation remained much lower during the post-Bretton Woods period than that during the adjustable peg period

What about the comparison between pre-basket and post-basket periods? It may be seen from Table 7.4 that the variation of real effective exchange rate during January '78-December '87, in addition to being well below its average level during the sterling peg period of July '72-September 75 (1.3-1.6 against 1.5-1.9 by the two statistical measures), it has not been much different from its level during the adjustable peg period of January '68-June '72 (1.3-1.6 against 1.2-1.6 by the two measures). Thus, in terms of variation of real effective exchange rate, the performance of the basket peg has been somewhat better than that indicated by the analysis of variation of nominal effective exchange rate.

7.7 Summary of Findings

The analysis of India's exchange rate uncertainty experience has been somewhat long drawn out by the sheer presentation of several measures of exchange rate uncertainty. Therefore, there is a need to bring together the different findings of that analysis. Table 7.5 provides the analysis in a summary form.

Table 7.5 tells the story of India's post-basket peg exchange rate uncertainty by eight different measures in the form of percentage changes from its average level obtained during the sterling peg, i.e., June '72-September '75. The post-basket peg period has been divided into two sub-periods: the first, corresponding to a short period of two-and-a-quarter years, i.e., October '75-December '77, and the second period consisting of the remaining period up to December 1987. In the initial period, the table clearly indicates that there had been considerable reduction in exchange rate instability computed by all the eight measures. The decline ranged from one-sixth to one third, a lower decline by the measure of MEAN ABS % CH particularly for the real exchange rate. However, it is rather difficult to draw a general conclusion regarding the experience in the remaining period. The worst is indicated by nominal effective variation by which there is only a marginal change in the average level of exchange rate uncertainty during the last decade in comparison with that during the sterling peg regime, with S.D % CH giving a small decline and MEAN ABS % CH giving a small rise. The real effective variation, however, declined by 13 percent by both basic measures. The variation of nominal effective exchange rate, which is nominal effective variation adjusted for the covariation between bilateral exchange rates, has been also lower during the last decade in comparison with the sterling peg period, by almost a quarter by S.D % CH but only marginally lower by MEAN ABS % CH. However, the best performance of the basket peg is indicated by the variation of rupee's real effective exchange rate. It recorded almost a uniform decrease of 16-17 percent by both basic measures from the level of sterling peg period. Another aspect of the decline in variation of real effective exchange rate during the last decade, which is not shown in Table 7.5 but can be seen from Table 7.4, is that it brought the rupee's variation of real effective exchange rate just equal to the average variation during the last phase of the adjustable peg period, i.e., January, 68-June '72, by S.D % CH measure and only marginally above that by MEAN ABS % CH measure.

Table 7.5 A Summary Analysis of the Performance of the Indian Basket Peg with respect to Exchange Rate Stability

Type of Instability Measure	Percentage Change from June '72 to September '75	
	Oct. 75 to Dec. 77	Jan. 78 to Dec. 87
A1. Nominal Effective Variation (NEV)		
1. S.D % CH	-28.7	- 6.1
2. MEAN ABS % CH	-27.0	+ 5.2
B1 Real Effective Variation (REV)		
1. S.D % CH	-30.2	-13.0
2. MEAN ABS % CH	-22.4	-12.9
A2 Variation of Nominal Effective Exchange Rate (VNEER)		
1. S.D % CH	-33.7	-22.7
2. MEAN ABS % CH	-26.5	- 4.5
B2 Variation of Real Effective Exchange Rate (VREER)		
1. S.D % CH	-30.7	-16.9
2. MEAN ABS % CH	-15.5	-15.9

7.8 Comparison with Past Studies

Now there remains the task of reconciling our results with the mutually contradictory results of two previous studies which we described in Section 7.4. Our results are consistent with those of Lipschitz (1979) whose study covered only up to the second quarter of 1978. Our more detailed study showed a substantial lessening of exchange rate instability up to December 1977 by using eight measures which contained both effective variation and variation of effective exchange rate in their nominal and real forms and by applying two mathematical formulae of exchange rate instability. Therefore, we have generalized Lipschitz's conclusion of the success of the basket system in achieving exchange rate stability in its initial immediate period. However, our study does not find the impact of the basket system on exchange rate stabilization as remarkable after the initial two-and-a-quarter years of its working as it had been before.

Therefore, Varghese (1984a, 1984b) is correct in her conclusion that the volatility of major bilateral exchange rate of the rupee continued to be as high in the post-basket period as they were in the pre-basket period. However, the author was not able to pinpoint the temporary reduction in the instability of bilateral rates in the immediate post-basket period. Besides, more importantly, our study reveals that although Varghese is correct with regard to nominal bilateral rates, the matter is different regarding real bilateral rates. The conclusion is also quite different when we consider variation in effective exchange rates, either nominal or real.

Footnotes: Chapter 7

1. Although exchange rate instability (volatility) and exchange rate risk (uncertainty) are conceptually separate as noted in the last chapter, they are used alternatively throughout this chapter and the rest of this thesis to mean the latter. The basic difference between the two is that the exchange risk constitutes only that portion of exchange rate instability which is unanticipated.
2. This is also the argument given by Mussa (1986) in employing period average exchange rates rather than end-of-the period exchange rates in his very detailed study of exchange rate volatility in sixteen advanced industrial countries. However, the author indicated that the use of the quarterly period average rather than end-of-the-quarter data reduces the variance of change in exchange rate by nearly one-third (p. 133 of Mussa, 1986)
3. In fact we did construct all the four versions of this measure as well and noted conflict in results between all of them and those under the other two, particularly during periods when the underlying exchange rate series exhibited marked upward trends. This, we believe, has validated our decision not to employ this measure further. In addition, we also tested for stationarity of all the major bilateral rates involved, both real and nominal, by using the Augmented Dicky-Fuller (ADF) test and found that only the first differences of these exchange rates (in percentages) are stationary.

4. About 14 percent of India's aggregate trade during 1979-81 has been with what is called the 'bilateral group' countries comprising the U.S.S.R, Poland, East Germany, Rumania and Czechoslovakia. The trade and financial transactions with these countries are settled in non-convertible Indian rupees.
5. The Reserve Bank data do not give the break-up of all the eleven currencies in the invoicing of India's trade. For the purpose of our calculation, we have distributed the small residual group data over the left out currencies among the eleven in proportion to their respective trade shares.
6. In the case of pound sterling and Australian dollar, the reciprocal, i.e., the units of U.S. dollar per the respective national currency is given in IFS. Therefore, the formula applied to these rates for deriving rupee rates is given by $e_j = e_i . e_{jus}$.
7. The more details of these phases were discussed in Chapter 4.

Chapter 8

Studies on Exchange Rate Instability and Trade Flows: A Survey

8.1 Introduction

Studies on the impact of exchange risk on trade flows differ both in the treatment of the exchange risk variable and in the inclusion of other variables that influence trade. Some studies consider exchange risk in nominal terms whereas others incorporate real exchange risk. There has also been a distinction between studies which concentrate on bilateral trade flows and those which consider aggregate trade flows of individual countries. Finally, whereas some studies employ a full-fledged supply-demand model in the specification of the exchange risk-augmented trade functions, others consider either a demand or a supply function. We propose in this chapter to review some of the major studies that estimated the influence of exchange risk on trade. Firist, we shall deal with developed country studies and later the studies on developing countries. In the final section we shall attempt a general evaluation of these studies.

8.2 Developed Country Studies

8.2.1 Early Studies

Among the early studies on the impact of exchange rate variation on trade must be mentioned the work by Clark and Haulk (1972) which, although carried out before the start of the current system of generalised floating, is significant as it covered the Canadian case for 1952-70 during the earlier part of which the Canadian dollar floated. This study used the standard deviation of daily nominal exchange rates during each quarter as the exchange risk variable but could not detect any adverse effect of exchange rate instability on the Canadian trade.

Makin (1976) studied the early impact of floating using data from 1960 IV to 1973 IV. This study estimated individual import functions for West Germany, Japan, the U.K. and Canada and contained a 6-monthly moving standard deviation as the exchange risk variable. Makin also did not find any significant effect of exchange rate variability on trade volume.

8.2.2 Recent Bilateral Studies

Hooper and Kohlhagen (1978) can be considered as the first systematic study of the impact of exchange rate uncertainty on trade flows. This study is in a way path-breaking as it inspired several studies which followed it. First of all, for the first time Hooper and Kohlhagen analysed bilateral trade flows in contrast to global trade flows of individual countries. Secondly, the study was based on a formal supply-demand model. It derived reduced form equations by solving the model in equilirium conditions. As a result, it could study the effect of exchange risk not only on trade volumes but also on trade prices. The study examined the bilateral trade of the U.S.A. and West Germany with other major industrial countries during 1965-75. The authors experimented with a number of exchange risk proxies including variances of weekly spot and forward rates and found out that the average weekly absolute difference between the current spot and past forward rates gave the best results. The conclusion of their study was that exchange risk did not have any significant effect on volume of trade but it strongly affected trade prices.

Hooper and Kohlhagen showed that the nature of the impact of exchange rate volatility on trade prices depends on the invoicing pattern of trade. Suppose the trade is denominated in exporter's currency. Then the importer bears the exchange risk as his payments in domestic currency is subject to uncertainty. That would reduce demand and thereby the price. On the other hand, if the trade is denominated in importer's currency then the exporter bears the risk causing a decline in supply and thereby a rise in price. The authors found that, nine out of eleven cases of prices of U.S. exports and German exports and imports where the trade invoicing is expected to be in exporters' currency, the proxy for exchange rate uncertainty had either weak negative or significantly negative co-efficients. This indicated that exchange risk was mostly borne by importers which depressed import demand and in turn their market prices. By contrast, in four out of five U.S. import cases, exchange risk had increased prices reflecting the fact that U.S. imports are invoiced mostly in dollar and hence, the exporter faced most of the risk which caused the prices to rise.

The contrast in the impact of exchange rate uncertainty between trade prices and volume indicated in Hooper- Kohlhagen study needs explanation. It may be noted that the authors used a very short-term trade model assuming only one-quarter order delivery lag. In that context they state, "This apparent discrepancy of a price effect in the absence of a statistically significant quantity effect could be explained by the presence of short-run price-inelastic export supply in the case of a fall in price and short-run inelastic import-demand in the case of a price increase". (p.501)

In the Hooper-Kohlhagen model, the future exchange rate is the only source of uncertainty, and future prices and costs are assumed to be known with certainty. Cushman (1983) modified this model to accommodate relative foreign-domestic price uncertainty together with nominal exchange rate uncertainty by using real exchange rate uncertainty. His study covered bilateral trade flows similar to that of Hooper and Kohlhagen, but extended them up to 1977. The real exchange rate uncertainty was measured by the moving standard deviations of four-quarterly percentage changes in real exchange rate ending in the current quarter. In contrast to Hooper-Kohlhagen results, Cushman found significant negative coefficients for exchange risk variable in six out of fourteen bilateral trade flows, but ~~a~~ fewer cases of significant price effects.

An I.M.F.(1984a) study extended Cushman's work for period up to 1982 by using a simplified version of his model and estimated equations for a much larger set of bilateral flows but could not find any significant effect of exchange rate instability on trade. This implied that Cushman's results were not robust across countries and time periods.

In a very recent study, Cushman (1988) repeated his 1983 exercise for the U.S. bilateral trade with other six major industrial countries for 1974-1983, and tried more proxies for real exchange risk in addition to the one in his earlier paper. The new risk variables make use of 12-monthly real exchange rate changes, instead of 4 quarterly observations in the old measure, for calculating quarterly moving standard deviation measures. Besides, they differ in the assumption of inflation and nominal exchange rate expectations.[1] Cushman could show that seven out of twelve U.S. bilateral trade flows had at least one significantly negative sign among all the five exchange risk proxies.

Cushman have several explanations for the dissimilarity between his recent results and the IMF results which contradicted his earlier study. Firstly, Cushman experimented with several risk proxies. Secondly, IMF results could be subject to a specification bias due to a structural change as it combined both fixed and floating rate periods. Kenen and Rodrik (1984) had earlier pointed out that the change in exchange rate regime could introduce a possible break in structure. Thirdly, Cushman notes that the IMF study did not correct for serial correlation in many of the trade equations. Finally, the IMF study suffered from omitted variable bias as it did not employ the full version of Cushman model but simplified it by omitting several variables.

Thursby and Thursby (1985) in their study of the impact of exchange risk, pooled the cross-section data of nineteen trading partners for 5 years, 1973-77. This study which used alternatively both real and nominal exchange rate variability measures found that exports (in value terms) were significantly affected in nearly half of the cases.

Much more interesting has been Thursby and Thursby's more recent study (1987) which, within a demand-supply framework, included variables to test three separate things: (a) the gravity model (b) the Linder hypothesis and (c) the exchange risk effect. The gravity model relates bilateral trade positively to incomes of the countries concerned and negatively to the distance between them. The Linder hypothesis, as applied to bilateral trade, implies that manufaturing trade between two nations will be negatively related to the difference in their per capita income. This study included seventeen countries for the period 1974-82 and, like their earlier one, pooled annual data for the estimation of bilateral export equations for each of these countries. The exchange rate instability measure was calculated monthly as the variance of the previous 12-monthly exchange rates around a quadratic trend, and then averaged for each year. Although both nominal and real exchange rate measures were tried alternatively in each equation, that did not make much difference in the results. The study yielded results to support the hypothesis that the value of bilateral trade is affected by exchange risk; of the seventeen export patterns, ten gave significantly negative coefficients for the exchange risk proxy. However, as the export data were in nominal units, the study could not distinguish between quantity and price effects.

8.2.3 Recent Multilateral Studies

A major drawback with the bilateral trade flow studies surveyed so far is that they do not take account of exchange rate effects of third country competition. For example, trade between country A and country B is influenced not only by the exchange rate between A and B but also by the array of exchange rates of these countries with those other countries whose products compete with the products of A and B. Therefore, it is more appropriate to make individual country's aggregate trade and effective exchange rate the focus of study rather than bilateral trade and bilateral exchange rate.

Akhtar and Hilton (1984) estimated price and quantity equations for aggregate exports and imports of two countries, the U.S.A. and West Germany for 1974-81. The study used quarterly data, and the exchange risk proxy employed was the standard deviation of daily nominal trade-weighted effective exchange rates during each quarter. Akhtar and Hilton opted for nominal exchange rate volatility measure on two arguments: one, the exchange rate changes are much more unpredictable than relative prices and two, there is no empirical support for the purchasing power parity principle over the medium-term. The regression study indicated weekly significant negative effect of exchange risk on U.S. export volume, strongly significant negative effect on German export and import volumes and weekly significant positive effect on U.S. import prices.

Gotur (1985) applied the Akhtar-Hilton methodology to three more countries (France, Japan and the U.K.) but came out with no signficant negative effect of exchange rate volatility on trade volumes of these countries but significant effects on their trade prices. Gotur also subjected the U.S. and the West German results of Akhtar and Hilton to a battery of sensitivity tests regading sampling period, Cochran-Orcutt autogression correction procedures, polynominal lag structure, volatility measure etc. The outcome of these tests cast serious doubts on the validity of the Akhtar-Hilton results.

The work by Kenen and Rodrik (1984,1986) marks an advance in the area of estimation of the impact of exchange rate volatility on trade. Akhtar and Hilton, although using effective exchange rates in computing exchange risk variable for each country, followed a rather ad hoc procedure for the purpose in the sense that the number of bilateral rates involved in the calculation of effective exchange rate for each country varied from country to country (nine for the U.S.A. and thirteen for West Germany). Kenen and Rodrik, on the other hand, standardized the procedure by defining effective exchange rate for each country in their study in terms of the same number of countries/currencies. Their study covered eleven developed countries (Group of Ten countries plus Switzerland) and, in order to calculate each country's effective exchange rate, they used bilateral rates between that country's currency and those of the remaining ten and weighted each rate by the share of the corresponding country in the total of that country's exports to or imports from the other ten.

Kenen and Rodrik admit that their procedure has two limitations: first, it ignores the exchange rates and inflation differentials between the developed countries under study and countries in the third world and second, it underplays the third market effects of exchange rate changes. Regarding the latter, we have already noted that the studies on bilateral trade flows completely ignored this factor. But in the multilateral trade flow study by Kenen and Rodrik, the variance of the trade-weighted effective exchange rate, although incorporating the covariance between the bilateral rates within the group of countries studied, do not give appropriate weighting to such covariance.[2] The only way to solve such a problem in a multilateral context is to use elasticity weights as we explained in Chapter 6.

Kenen and Rodrik considered three basic measures of exchange risk, all of them in real terms: (1) the standard deviation of the monthly percentage changes in real exchange rate, (2) the standard error of real exchange rate obtained from a log-linear trend equation, and (3) the standard error of real exchange rate obtained from a first-order autoregression equation. Each of these basic measures had two versions; the first covers the 24-month period preceding the current quarter and the second covers the 12-month period preceding the current quarter. Of these two versions, the former, i.e., the one based on the preceding 24-month period was claimed to have performed better. The study used only the floating period (1975 I - 1984 IV) which according to the authors avoid specification bias on account of the change in the exchange rate regime. Finally, they used a trade model incorporating, in addition to the exchange risk variable, the income and price variables consistent with the current literature on international trade. We may, however, note one possible bias in this model, namely, the neglect of the capacity variable, a common affliction with many of the contemporary trade models.[3]

Kenen and Rodrik (1986) reported seven (out of eleven) negative effects of exchange risk on imports of which only four were significant. In their 1984 study, which covered exports as well, there were many positive effects on exports and only three negative significant effects. In short, Kenen and Rodrik studies on exchange rate volatility and trade, although brought some methodological improvement in the field of investigation and showed some evidence of the depressing effect of exchange rate volatility on trade volumes, the evidence produced by them does not appear to be overwhelming.

It may be noted that the debate on whether exchange rate uncertainty should be treated as a nominal variable or a real variable continues. In a recent study undertaken by Bailey, Tavlas and Ulan (1986) for the major seven industrial countries, the authors used a nominal exchange risk variable. This study which used quarterly data for 1973 I through 1984 III, regressed the aggregate export volume of each of these countries on the real GDP of 12 OECD nations, real export earnings of oil exporters, the terms of trade and the exchange risk. The terms of trade is defined as the ratio of the export unit value index of each country in dollar terms to the dollar export unit value index of the IMF's 'industrial country' group.[4] Since the terms of trade term has dollar unit values on both the numerator and the denominator, it is, in fact, the real terms of trade and the authors consider it standing for the real exchange rate in terms of traded goods.

The particular measure of exchange rate instability employed by Bailey et al. is very simple, namely, the absolute quarterly percentage changes in nominal effective exchange rate. The effective exchange rate made use of by the authors are those calculated by the Morgan Guaranty Bank. The authors tried the volatility measure both in its current quarter form and also in an eight-period, second degree polynomial-distributed lag form. However, the study could not report any significant relationship between exchange rate volatility and aggregate exports in any of the seven industrial countries.

Bailey et al. conducted a more recent study (1987) which covered the period 1975 I - 1985 III. This work differed from the earlier one in at least three main regards: (a) the alternative use of nominal and real exchange risk measures, the latter adjusted for the differential movements in manufacturing wholesale price indices between home and trading partner countries, (b) the consideration of a second basic measure of exchange risk i.e., an eight-quarter period moving standard deviation besides the earlier measure of absolute quarterly percentage changes, and (c) the extension of the study to four smaller OECD countries in addition to the big seven OECD countries covered in the earlier study. The authors found a negative and significant impact of real exchange risk for Italy with regard to both of the basic statistical measures, and for Germany based on the measure of absolute quarterly percentage changes. The nominal exchange risk did not yield any significant results which is consistent with the authors' earlier study. Considering only those equations which incorporated only the real exchange risk measure, the authors got only three instances out of seventeen where the exchange risk negatively and significantly affected real exports. On the other hand, in two cases, i.e., the U.K. and the U.S., the real exchange risk gave positively significant results. The authors argue that the positively significant results of exchange risk on trade volume are consistent with theory. We already discussed in Chapter 6 about the theoretical possibility of a positive relationship between exchange risk and trade volume and we will again have occasion to refer to it later in this chapter.

8.3 Developing Country Studies

In contrast to developed country studies, the studies on the impact of exchange rate instability relating to developing countries have been few and far between. That appears strange in the context of a more likely adverse impact of exchange risk that developing countries could have had, in comparison with their developed country counterparts.[5] Besides, while exchange rate instability in developed cuntries could be endogenous resulting from other developments within the country, a fact which makes the estimation of its separate impact econometrically difficult (see I.M.F., 1984a, pp.33-34), in LDCs, exchange rate instability is largely exogenous, imposed from abroad or resulting from the pegging behaviour of their governments. This fact should make the trade effects of exchange rate volatility more easily measurable in LDCs. One reason for this relative neglect in the study of LDC experience relating to exchange rate instability could be that most of the developing countries have adapted themselves to the world-wide floating of major currencies by following one type or other of pegging systems which could presumably have had the effect of insulating them, on the average, from high exchange rate instability.

Two of the early econometric studies to test the link between exchange rate uncertainty and LDC exports could be found in Behrman (1976, pp.185-90) and Diaz-Alejandro (1976, pp.66-71). Both of these studies cover the pre-floating period. The first dealt with the Chilean case of real exports subdivided into agriculture, mining and industry for 1947-65. It showed that exchange rate variation, measured as the standard deviation of real exchange rate, had highly significant adverse effects on mining and industrial exports and marginally significant adverse effects on agricultural exports. The second study pertains to the Colombian experience during 1955-1972 for exports other than coffee and oil[6], and reported significant negative impact of exchange rate uncertainty, proxied as the standard deviation of quarterly percentage changes in real exchange rate, on the growth of Colombian dollar value of exports of non-traditional items, which are largely manufactured products. However, this study could not detect any impact of exchange rate uncertainty on a group of primary commodity exports consisting of bananas, cotton, sugar and tobacco (BCST).

The dissimilarity in the effect of exchange risk as between agricultural and non-agricultural exports brought out in the two early LDC studies mentioned above is significant. We may explain why the exports from agricultural sector are less affected by exchange risk than those from non-agricultural sector in terms of the lower price elasticity of supply in the former sector than the latter. From this result it would be wrong, however, to conclude that agricultural exports are free from all adverse effects of exchange risk. To examine the issue further, we need to estimate the impact of exchange risk on agricultural export prices separately. Unfortunately, there have been no LDC empirical studies so far testing separately the impact of exchange risk on export prices.

A major work which examined the relationship between exchange rate uncertainty and trade in a developing country context has been Coes (1981), which deals with the Brazilian experience before and after the introduction of the crawling peg in August 1968. Coes estimated export equations[7] for 22 sectors covering both primary and manufacturing products using annual data for 1957-73. Coes argues that for Brazil, taking the cruzeiro - U.S dollar rate as the nominal exchange rate and the ratio of the U.S. and Brizil's wholesale price indices as the relative price for converting the former into real exchange rate, would not be much off the mark. Regading the relevance of real exchange rate uncertainty rather than its nominal counterpart in Brazil, Coes states, "Although money illusion may linger on elsewhere, it is reasonable to assume it long dead in Brazil ...." (p.114). The author is referring to the effect of long period of high inflation which engenders a consciousness for real exchange rate among economic agents. This has direct relevance on the choice of exchange rate volatility measure between the real and the nominal that remains a highly contested issue in the literature.

Coes constructed real exchange rate uncertainty indices for Brazil based on Rothschild-Stiglitz (1970) 'mean-preserving spread' with the additional assumption of non-increasing absolute risk aversion. The estimation of the equations which included additional variables representing domestic demand (capacity utilization) in the economy and relative prices of export products yielded highly significant negative effects of exchange rate uncertainty on exports in majority of cases.

Although the study on Brazil indicated adverse effect of exchange rate instability during the pre-crawling peg period, Coes himself is cautious in drawing a strong conclusion from these econometric results. It is possible that the uncertainty proxy could be capturing the effects much more of a change in the economic environment of Brazil since the late 1960s when government policy there began clearly to become more export-oriented. The case of Brazil is atypical in two other ways: first, it was not a case of increased exchange rate instability after the breakdown of the Bretton Woods adjustable peg system but rather of decreasing real exchange rate uncertainty after 1968 with the introduction of a crawling peg, and second, the quantum of change in exchange rate instability was much larger in Brazil than in the case of many developed as well as developing countries.

Gupta (1980) considered the impact of exchange rate uncertainty on the exports of five developing countries (India, Israel, South Korea, Mexico and Taiwan) during 1960 I - 1978 IV. The author addressed himself to two basic questions: one, whether exchange rate uncertainty has depressed aggregate exports of these LDCs and two, whether in the case of countries which adopted a single-currency peg, there has been a shift in their exports toward the peg-currency country.

Gupta used export supply functions on the assumption that these countries face a perfectly elastic demand curve for their products.[8] The supply variables included in the export function are export price, domestic price and a capacity variable represented by the logarithmic trend in industrial production. Two alternative measures of exchange risk were computed by the author from the price of domestic currency in terms of the SDR: (1) the mean absolute error, i.e., the mean of the past 12-month absolute first differences (not in percentages) of exchange rates and (2) the root mean square error, i.e., the square root of the mean of the squares of past 12-month first differences of exchange rates. The first measure, as claimed by the author, is sensitive to the frequency of changes in exchange rates and the latter sensitive to the magnitude of changes.

The study by Gupta on aggregate exports indicated significant negative effects of exchange risk for India and Israel and not for any of the other countries. Regarding bilateral exports, the author could not find any evidence for the 'trade concentration' hypothesis in countries which maintained a fixed relation with the U.S. dollar during the period under study (i.e., Mexico, Taiwan and South Korea).

Gupta's study, however, suffers from a number of difficulties. First of all, it relies on the static expectation hypothesis regarding exchange rate risk and does not consider alternative measures like the standard deviation of percentage changes. Secondly, Gupta's measure of exchange rate instability is not free from unit of measurement and, therefore, is subject to bias even for intra-country comparison. Thirdly, the simplification of exchange rate as the SDR value of domestic currency may not be quite appropriate for the set of countries covered in the study. Fourthly, with regard to India, the study estimated a high productive capacity elasticity in export function (0.8 - 0.9) along with a very low export price elasticity (0.03) implying a heavy self-driven pressure for exports in that country irrespective of the price situation. This cannot be true for a strongly inward-oriented economy like India.

While in the literature the controversy regarding whether nominal exchange risk or its real counterpart is the appropriate variable to include in trade equations continued, Bautista (1981) defined the concepts of nominal and real exchange rate in an altogether different fashion such that both the real and the nominal risk variables could simultaneously be used in the same equation. He computed nominal exchange rate as a net (export minus imports) trade-weighted effective exchange rate so that it measures the anti-export bias in favour of import-substituting industries. On the other hand, the real exchange rate is computed as an export-weighted real effective exchange rate so that it measures the anti-export bias in favour of production for the domestic market.[9] The two measures of exchange rate instability are computed for each month as the standard deviation of the previous 12-month nominal/real exchange rates and averaged for each quarter. Bautista's study covered samples of 22 LDCs for the period, 1974-79, and used quarterly data on export earnings in U.S. dollars. It gave negatively significant effects for only two cases (Argentina and Portugal) of nominal exchange rate uncertainty, and four cases (Argentina, Colombia, Greece and South Korea) of negatively siignificant effects of real exchange rate uncertainty. The author also reported two additional cases of marginally significant negative effects with regard to nominal exchange risk (Morocco and Philippines), and five additional cases of marginally significant effect of real exchange risk (Costa Rica, India, Mexico, Spain and Taiwan).

Bautista's exchange risk results are vitiated by the fact that he employed the standard deviation of nominal/real effective exchange rather than the standard deviation of percentage changes in nominal/real effective exchange rate. We have discussed at length in Chapter 6, the drawback of the former measure when exchange rate series exhibit a clear trend. In simple terms, Bautista's measure cannot be taken as a measure for short-term exchange rate instability as it would have captured a part of the long-term trend of the series as well.

Rana (1982) examined the effect of exchange rate uncertainty on import volumes in four ASEAN countries (South Korea, Taiwan, Thailand and Philippines) by speciifying an import demand function which, other than the exchange risk variable, contained relative price, real income, real export earnings and the nominal import-weighted effective exchange rate. The author employed various alternative exchange risk proxies based on standard deviation and Gini mean difference of quarterly proportionate changes in both nominal and real import-weighted exchange rate. The study which covered different periods for different countries from 1960 I to 1977 II showed that import orders were significantly affected by real exchange rate instability in three countries (South Korea, Philippines and Thailand) and by nominal exchange rate instability in one country (Taiwan).

All the developing country studies so far, considered aggregate trade (except that a part of Gupta's study was on bilateral exports). Chan and Wong (1985), in contrast, estimated bilateral export functions for Hong Kong with regad to her major markets, the U.S., the U.K. and West Germany for 1977 I - 1984 III. Besides real income of the importing country, real exchange rate and time trend variables, Hong Kong's export function included the exchange risk proxy computed, following Cushman (1983), as the standard deviation of quarterly percentage changes of real bilateral exchange rate for the recent four quarters ending with the current period. However, the authors found no empirical evidence of any significant negative effect of exchange rate variability, current or lagged, on the volume of Hong Kong's bilateral exports in spite of experimenting with alternative estimation methods. However, the estimates of Chan and Wong could be challenged as they are subject to simultaneity bias stemming from the neglect of supply influences.

8.4 A General Evaluation

The survey of the major studies on the impact of exchange rate instability indicates rather mixed results. There could be several possible reasons why studies have not produced conclusive evidence of an adverse impact of short-term exchange rate volatility on trade flows.

First, the previous studies perhaps have not been able to construct proxies of exchange risk which could reasonably capture the cost of exchange risk. In more recent years there have been attempts to employ a series of risk proxies based on different expectations assumptions in an attempt to get significant results by at least one of them. This is a questionable approach as the authors have not been able to give any convincing reason for choosing one proxy over the others but rather have gone by the performance of each proxy in producing "good results". Here we notice a highly objectionable tendency to forego the need to pursue good theory in selecting an appropriate exchange risk measure in favour of an attempt to report significant statistical results.

Willett (1986) suggests the need for analysing the impact of exchange risk on trade flows by examining the contribution the exchange risk makes to firm's overall portfolio risk. He particularly points to the empirical studies which indicate a reduction in overall risk through inclusion of several risky international assets. Theoretically, this arises from diversification of the risk, i.e., through the negative covariance between a firm's different assets, the returns from each although exhibit high variance. (See also Farrell et. al., 1983). If this is true then it can explain, to a certain extent, the insignificant or even positive exchange risk effects detected by some previous studies on developed country trade volumes. This is also consistent with the theoretical possibility of a stimulating effect of exchange risk on trade put forward by Bailey et al. (1987).[10]

Second is the argument by the defenders of the present floating system that exchange rate instability is more a reflection of the underlying instability of the domestic economies than an independent cause of instability by itself. (Willett, 1986, p.S102). Thus exchange rate instability is not exogenous but rather endogenous, and hence capturing its separate effect, if any, is statistically difficult. This idea is very well echoed in the review of exchange rate volatility studies by the I.M.F.(1984a).

Pursuing the above-mentioned idea further, it can be envisaged that attempts to keep exchange rates stable administratively in the presence of underlying instability of the system could jeopardise trade more than when exchange rates are allowed to be unstable to absorb the disturbance elsewhere in the system. For example, in the event of a fall in demand for a country's exports, exports and domestic output could be stabilized if the exchange rate is free to depreciate. On the other hand, if the exchange rate were kept rigidly fixed that would be destabilizing to the domestic economy. Therefore, exchange rate instability need not be costly in a relative sense (see Crockett and Goldstein, 1987, p.3).

In an absolute sense, it is pointed out that the exposure to risk arising from exchange rate instability has been reduced by the development of effective hedging techniques and future markets at a relatively low cost (see Group of Ten Report, 1985, paragraph 16). This could be a third reason for not finding adequate evidence of an adverse effect of currency risk on trade volumes.

Fourth, the previous studies could be at fault in employing imprecise trade functions. There are a number of influences on trade behaviour and it has not been easy to select the most crucial variables. Particularly, most trade models are not fully specified supply-demand models, but either simple demand models which ignore the supply variables or supply models which ignore the demand varibles. The specification of a satisfactory dynamics for the equation is yet another difficult issue. It is possible that the impact of exchange risk on trade flows could take a much longer period than what has been allowed for by the previous investigators using mostly quarterly data. In short, the previous exchange risk studies may have been subject to specification mistakes relating to trade equations.

Each of the reasons detailed above that are likely to be behind the failure to establish empirically a definite link between exchange risk and trade flows, need to be looked at from the point of view of developed and developing countries separately. Regarding the inaccuracy of the exchange risk proxies used, we agree that there is need to view exchange risk in an altogether different perspective. In the context of developed countries, there appears to be a large involvement in trade of big multi-product multinational firms. These firms possess firstly, a great degree of geographical dispersion in their trade and secondly, asset portfolios which are highly diversified. The first aspect makes the 'variation of effective exchange rate' a more reasonable proxy of exchange risk than the 'effective variation', while the second aspect entails the consideration of covariance relationships among the entire asset portfolios of the trader in order to determine the exchange risk effect.

In LDCs, individual trading firms are neither much diversified geographically nor do they possess diversified international asset portfolios. Therefore, an 'effective variation' measure like the one initially suggested by Frankal (1975) would be a more appropriate proxy for exchange risk (see also Lanyi and Suss, 1982; and I.M.F., 1984a). However, it may be noted that, we have not come across any single empirical trade study on developing countries making use of effective variation measures.

Endogeneity of exchange rate instability is also true mostly with respect only to developed countries. In the case of most developing countries, exchange rate instability is largely imposed from abroad due to the instability of major currencies in the international market and partly also due to the pegging practices of developing country authorities. Therefore, we expect the tractability of the impact of exchange rate instability easier in these countries than in developed countries.

The availability of low-cost insurance facilities for the market operators is found mainly in developed industrial countries. The majority of developing countries still lack well developed financial markets with arrangements for forward cover and, therefore, market participants in these countries are exposed to high exchange risk (see Group of Twenty-Four Report, 1985, paragraph 63).

The fourth and final explanation for the lack of robust exchange risk results is the familiar mis-specification problem. It appears that this difficulty is more evident in developing countries than for developed country studies. The formulation of an export function is beset with greater trouble in the context of the former than the latter. This is particularly so due to the significance of supply factors in the former. More of this will be discussed in Chapter 9. However, it needs saying here that, in order to improve upon the estimates of the trade effects of exchange risk in developing countries, more attention have to be paid on first, the correct specification of trade equations and second, the construction of accurate statistical proxies of exchange risk relevant to these countries.

Footnotes: Chapter 8

1. Regarding nominal exchange rate expectations, one measure uses forward exchange rate without risk premium and two other measures make use of time-varying risk premium. See Cushman (1988) pp.320-1 for more details.
2. See Cushman (1986) for an attempt to incorporate third country exchange risk effects for U.S. exports within a bilateral framework by the use of covariance term.
3. See the trade literature survey for Goldstein and Khan (1985). By ignoring the supply side of trade, these studies assume infinite elasticity of export supply with respect to price and other variables.
4. For Canada, the terms of trade term uses the export unit values of Canada and the U.S. as the bulk of the former's exports is to the latter.
5. Please see the earlier discussion in Chapter 6.
6. These exports are termed 'minor exports' in Colombia.
7. The ratio of the volume of actual exports to total exportable production which Coes called 'export coefficient' was the dependent variable. When both exports and production of exportables are increasing fast as was the case in Brazil during 1968-73, the ratio of the two would be a more appropriate variable for a stringent test of the effect of exchange rate uncertainty on exports (Coes, 1981, p.120).
8. Gupta also estimated the export supply function in a simultaneous equation model applying Two-SLS method and found no appreciable change in the results and, therefore, concluded that for these countries the small country assumption is validated. However, it may be noted that in the demand equation employed by Gupta, there was no exchange rate

volatility variable which is questionable.

9. While the nominal effective exchange rate is influenced solely by the movements of foreign currencies, the real effective exchange rate could be influenced by the independent pegging behaviour of the LDC. See also Lipschitz (1979) and Bautista (1982) for the mathematical proof.

10. See a discussion of this point also in Chapter 6.

Chapter 9

Did Exchange Rate Instability Affect India's Exports?: An Econometric Study

9.1 Introduction

We saw in Chapter 7 that although the Indian's basket system had been able to reduce exchange rate instability particularly in real terms in comparison with the previous sterling-peg period, the record had not been uniform throughout. In the basket period, there had been years of falling exchange risk[1] followed by years of rising exchange risk. The question then arises how damaging had been exchange rate volatility to the Indian economy?

The topic of the impact of exchange rate instability or uncertainty is quite broad and our focus in the construction of the instability measures has been on the merchandise trade and thereby we had completely abstracted from the invisibles and capital account of external transactions. A justification for such a narrow focus is that trade in invisibles and capital flows are much less sensitive to exchange rate risk than trade in merchandise in a developing country. Cannot the same argument be applied to the case of imports as well in the context of a highly controlled import regime that operates in India? In Chapter 7 we considered the imports in the construction of various exchange risk measures for India since we believed that there is an impact of exchange risk on the economy operating through the channel of imports. Most of India's imports consist of vital imports to the industrial and agricultural sectors of the economy and a part of it also goes towards meeting the essential consumption requirements of the people. Therefore, exchange rate volatility is bound to have effects on the economy as a whole via imports.

It is one thing to know about the existence of an impact of exchange risk through imports, but it is quite a different thing to estimate that impact. It is really difficult to estimate the impact of exchange risk on imports. The impact of exchange risk on imports is not expected to be felt in the short run in the Indian context in the form of quantity and price effects as it is normally absorbed in the government budget and in the profitability of private importers. This is so because quite a substantial portion of India's imports are canalized through governmental agencies and the bulk of the balance of imports made by the private sector is subject to quantitative restrictions. The impact of exchange risk on India's exports, on the other hand, is easier to estimate as that is expected to be exhibited fairly quickly in terms of price and quantity. This is basically on account of the fact that in India there is a larger role for market forces in the export sector than in the import sector. In this chapter, therefore, we confine ourselves to India's export sector and estimate the impact of exchange risk on that sector alone.

While the main focus of attention is towards the impact of exchange risk on India's exports, we are also greatly interested in the impact of the exchange rate on exports. In the context of a general study of India's exchange rate regime, how exports respond to exchange rate changes is of crucial importance. Particularly with the above-mentioned government control on imports, the efficacy of the exchange rate policy in India hinges very much upon the exchange rate elasticity of exports.

9.2 Methodology

We develop a general model for India's exports. This model will be first of all employed in estimating aggregate exports. We will subsequently adapt this model in estimating separately the two major component groups: (i) manufacturing product exports and (ii) non-fuel primary product exports. The need for disaggregate estimation of trade behaviour has received considerable attention ever since Orcutt (1950) wrote his famous article on trade estimation problems. We explain below the rationale of this approach in our particular context.

It is now well known that export elasticity (demand and supply) with respect to price is quite different as between manufactured and primary products. Therefore, when the share of these two components in aggregate exports are varying over time, the elasticity estimate from an aggregate equation is likely to be unstable. For India, the share of manufactured products in aggregate exports rose steadily from 51 per cent in 1968 to as high as 72 per cent in 1986.[2] Secondly, when export prices of higher elasticity export products exhibit lower variation compared to those of lower elasticity products, then the "historical" price elasticity estimated from an aggregate equation would be inappropriate for policy purposes. This was illustrated by Orcutt (1950) and Barker (1970) in the case of price elasticity of import demand; they found that primary commodities had higher price variations compared to manufacturing products. (See also Magee, 1975, pp.206-7).

Another major issue in the estimation of an export function is the simultaneous equation problem, i.e., the price and quantity of exports are determined simultaneously through the operation of both demand and supply factors and in practice it is not possible to identify demand and supply factors separately through single equation methods. However, the demand equation can be estimated without bias if the supply function is infinitely price elastic, or if the demand function is stable whereas the supply function is unstable. Similarly, the supply function can be estimated without bias if the demand function is perfectly elastic, or if supply equation is stable while the demand equation is not (see, for example, Maddala, 1977).

A large volume of empirical trade studies has relied on one or the other of the above simplifying assumptions. Thus, a number of export studies have estimated export demand functions through the ordinary least squares method.[3] This procedure is less justifiable for developing countries than for developed countries as the assumption of supply constraints is more valid in the former case than in the latter. In spite of the importance of supply factors in LDCs, researchers have been estimating single equation export demand functions for these countries ignoring completely the significance of supply in exports [e.g. Houthakkar and Magee (1969), Dornbusch (1985), Rittenberg (1986), and Bahmani-Oskooee (1986)]. We have also some early studies concentrating on India which have estimated demand functions for India's exports without making any allowance for supply factors [e.g. Dutta (1965), Da Costa (1965), and Agarwala (1970)], although as noted by Peera (1979), Indian exports had been subject to severe supply constraints during the period covered in these studies.

In contrast, there have been a number of other studies which link LDC exports to supply factors alone including trade policy, a survey of which can be found in Bond (1985). One can very well justify the estimation of a single export supply equation for LDCs. The argument is that a typical developing country is small such that it has no influence on world price of its exports and, therefore, it is facing an infinitely elastic demand curve for its export products. Ali (1984) estimated a single equation aggregate export supply function for India and, he justified the approach by stating that India has a very small and declining share in world exports.

However small may be the share of India in world exports, the country could still be important in specialized items. In particular, there have been a number of items in India's export basket whose share in world exports has been rising (e.g., leather products, gems and jewellery, articles of apparel and clothing materials). The predominance of manufacturing products in India's exports could also imply a possible downward sloping demand curve for her exports. Even in certain primary commodities, India has a large share in world exports (e.g., tea, raw leather, cashew kernels, pepper and shrimp) and one cannot rule out the possibility of India influencing world price in these items.

The point that is raised is that, single equation estimation of either a demand function or a supply function is likely to give biased and inconsistent estimates for India's exports. One solution to this problem is to use simultaneous equation methods as was done by Khan (1974) for a number of developing countries including India, Sundararajan (1986) and Lucas (1988) for India, and Riedel (1988) for Hong Kong. The most popular simultaneous equation method is the two-stage least squares. All simultaneous equation methods give consistent estimates, but in the context of a small sample, the bias in the estimates can be quite large. Therefore, following Bond (1985) we have chosen the alternative of solving the demand and supply model for equilibrium conditions to obtain the reduced form equations and estimate those equations by ordinary least squares. The estimated coefficients from such a procedure will be unbiased but they will be a mixture of both demand and supply parameters and, therefore, individual parameters from the structural demand and supply functions cannot be recovered as the system is bound to be over-identified in most cases (see Maddala, 1977).

9.3 An Export Model for India

As indicated above, we do not make any extreme assumption about the nature of export demand and supply and attempt to specify a general demand and supply model for India's exports with the objective of solving it under equilibrium conditions. We try to incorporate as many explanatory variables as theoretically relevant in a general case, and leave for estimation the burden of deciding the significance of those variables in the determination of aggregate exports as well as of the two component groups, namely, manufacturing and non-fuel primary product exports.

Export Demand:

Modelling export demand is fairly simple. One approach is to follow the conventional demand theory in which the consumer is assumed to maximize utility subject to a budget constraint (see Kohli, 1980 and Goldstein and Khan, 1985). Applying the utility-maximization approach, we can derive the demand for export quantity as a function of foreign currency price of exports, prices of foreign competing products, foreign money income and nominal exchange risk. On the assumption of absence of money illusion for the foreign consumer, the export demand becomes a function of the ratio between foreign currency export price and the price of foreign competing goods, foreign real income and real exchange risk.

The above mentioned approach is valid for India's manufactured products which can reasonably be assumed to be directed towards final consumption abroad. However, for India's primary commodity exports it would be more appropriate to evoke the production theory and assume a cost-minimization approach. (See Burgess, 1974; and Kohli, 1982). Thus, with the additional assumption of absence of money illusion on the part of foreign producers who demand India's primary products, the quantity of export demand is a function of the ratio between foreign currency price of exports and the price of foreign competing composite input, foreign real gross output and real exchange risk.

However, if we assume that the foreign price would represent the price of final goods competing with India's manufactured product exports and also the price of composite input competing with India's primary product exports[4], both approaches yield to a single common equation. We additionally assume a multiplicative form of equation for all explanatory variables including the exchange risk variable[5]. Thus the export demand equation, ignoring the error term, becomes:

$$(1) \qquad XQ_d = \alpha_d + \beta_d (XP + E - FP^*) + \gamma_d WY + \delta_d R$$

where the term for each variable represents its logarithms and the subscript d stands for demand; XQ_d = quanity of export demand; XP = domestic currency price of exports; E = nominal. effective exchange rate (units of foreign currency per domestic currency); FP^* = foreign price (in foreign currency); WY = world real income; R = real exchange risk; α_d = constant; β_d and γ_d are demand elasticities with respect to relative price and world income respectively; and δ_d is demand elasticity with respect to exchange risk. The signs of the parameters are expected to be:

$$\beta_d < 0; \gamma_d > 0; \delta_d < 0$$

We further assume that export demand adjusts instantaneously within a year to changes in all explanatory variables.

In fact, an export demand function should take into account the impact of tariff and non-tariff barriers to trade. We have not incorporated them here as their quantification is very difficult. In particular, the international quota system prevailing in textile trade, i.e., the Multifibre Agreement (MFA), tariff and non-tariff barriers on India's exports to the EEC, non-tariff barriers against India's marine products to the U.S. and meat to the Middle East are worth mentioning (see Wolf, 1982; Nayyar, 1987; and Sapir and Stevens, 1987). However, it is expected that leaving out the influence of these trade restrictions on India's exports does not severely affect the results of our study.[6]

Export Supply:

Modelling export supply is more complicated and is very much a controversial part of empirical work on trade (Goldstein and Khan, 1985, p. 1047) and that could be a reason why the supply side is assumed away in most empirical studies. In the context of developing countries the task is made more difficult due to two reasons: firstly, there exists a very complex system of export incentives in these countries and, secondly, the capacity to export in these countries is partly affected by rising domestic demand for exportables (Riedel, 1988, p. 138). In the context of India, these factors are particularly relevant as explained below.

In fact, the Indian export supply situation is complicated due to the presence of a highly protected domestic industry, on the one hand, and a complex system of export subsidies, on the other. The licensing-cum-tariff system of import control provides a high incentive for import-substituting industries thereby rendering export production relatively unattractive. As if to offset this imbalance, the export sector has been provided with a variety of subsidies. The Indian export incentive system consists of (a) a duty drawback system (b) cash compensatory support, (c) concessional export credit (d) tax rebates on export income and (e) import replenishment licenses. We are not going into details of each of these schemes except to say that previous studies[7] have pointed out the highly unsatisfactory nature of the Indian export incentive system. Apart from the long delay in the disbursement of the claims under these items, it has been noted that they do not amount to much in the form of additional incentive for exports as the bulk of it just compensates for the disadvantages in export production in comparison with production for domestic sales. Secondly, a quantitative assessment of the total subsidies under all these schemes is exceedingly difficult particularly because of the provision for the transferability of the import replenishment licenses for exporters. There is no accurate picture of the premium these licenses carry in the market, the knowledge of which is necessary to determine the quantum of incentive under this scheme.

The export subsidy system which had been in operation in India since the early 1960s was dismantled in June 1966 following the rupee devaluation only to be reintroduced more or less in the same form just after two months. The system underwent several modifications since then. Nevertheless, a recent study by Nayyar (1987) shows that the tinkering of the export subsidy system in India has not led to any major "qualitative or even quantitative change" during the seventies and early eighties (p. AN-80). Our study covers the period 1968 to 1986. Although we do not fully subscribe to the view that leaving out the export subsidy system from the export supply function is theoretically correct in the Indian context, partly because of the difficulty in computing the series on ad valorem rate of net export subsidy and partly also because of Nayyar's assertion of its unchanged qualitative and quantitative significance during the period under study, we do not consider export subsidies in the Indian export supply equation. However, we state that to the extent that export subsidies have affected the growth of India's exports, our estimates will be biased.

Next, we have to consider the importance of demand pressure as a factor influencing export supply in India. It could be argued that the effect of demand pressure on exports is picked up by domestic price; the higher the demand pressure the larger will be the domestic price, and larger the domestic price the less will be exported as domestic market becomes more attractive for the exporter. We argue that domestic price only partially captures the impact of domestic demand pull on India's exports. The reason is that at the margin, firms have a natural preference for domestic market to foreign market due to the fact that domestic market is more secure and less competitive than the foreign market.

There could be at least two ways in which domestic demand pressure cuts into exports. Firstly, the process of domestic industrialization is bound to generate a general awareness of the potential extra profits that can be had by converting the hitherto exported primary commodities into more value added items either for the domestic market or for exports. Animal skin and raw leather, raw cotton, tobacco and iron ore are examples. Secondly, with an overall rise in domestic demand one can expect a rise in consumption of exportables too. Tea is a typical case in point. The share of India in world market of tea has been declining steadily which is attributed to the rising domestic absorption (see Baladi and Biswas, 1987). Coffee, sugar and spices are other examples.

How do we incorporate the impact of demand pressure in an export supply function? We employ domestic real absorption, i.e., real consumption plus real investment (including government expenditure), as a proxy for domestic demand pressure that curtails exports. Real national income is sometimes used to pick up the domestic demand pressure (see Srinivasan and Bhagwati, 1975; and Baladi and Biswas, 1987). But real national income in the context of LDCs could represent more the productive capacity than the demand pressure as real income in these countries is driven more by the supply side than the demand side.

The best way to specify an export supply function for a developing country appears to be to combine the profit-maximization approach with the domestic absorption factor. Holly and Wade (1986) give a clear exposition of how an export supply can be formally derived from a profit function. We have modified that approach by incorporating the additional variables that represent exchange risk and domestic demand pull. The resulting export supply equation in logarithms is given as:

$$(2) \quad XQ_S = \alpha_S + \beta_S\,(XP\text{-}HC) + \grave{\beta}_S\,(XP\text{-}HP) + \gamma_S\,KF + \delta_S\,HA + \epsilon_S\,R$$

where XQ_S = quantity of export supply; XP = export price in domestic currency; HC = domestic production cost; HP = domestic price; KF = real fixed capital stock; HA = domestic real absorption; R = real exchange risk; α_S = constant term; β_S, $\grave{\beta}_S$, γ_S and δ_S are export supply elasticities with respect to the respective variables in the equation; and ϵ_S is the supply elasticity with respect to exchange risk. The signs of these parameters are given by

$$\beta_S > 0;\ \grave{\beta}_S > 0;\ \gamma_S > 0;\ \delta_S < 0 \text{ and } \epsilon_S < 0.$$

The first variable on the right-hand side of equation (2), i.e. (XP - HC), represents the absolute profitability of exports; the larger the difference between export price and domestic cost, the higher will be the profitability of exports. The second variable, (XP-HP), indicates the relative profitability of exports, i.e., the profitability of export sales in comparison with domestic sales. Given the domestic cost conditions and domestic price of tradables, the trader will supply more to the foreign market and less to the domestic market if export price rises. Given the export price and cost conditions, the exporting firm will supply less to the foreign market and more to the domestic market if the domestic price of exportables rises. Besides, domestic resources can be transferred from the production of tradables to non-tradables. In the case of a rise in price of domestic non-tradables (which is also reflected in domestic price), export price and domestic price of tradables remaining the same, the trader can shift from the production of tradables as a whole to non-tradables thereby reducing exports.

We did mention about the tariff-cum-licensing system which characterizes India's import regime. Import controls adversely affect exports in two main ways: firstly, by making exports more unprofitable than import substitutes and secondly, by denying cheaper raw materials, components and machinery either domestically or from abroad (see Clements and Sjaastad, 1984; and Greenaway and Milner, 1987). The export supply function specified above is able to capture this typical Indian phenomenon through domestic price and domestic cost as is evident from the description in the previous paragraph.

The theoretically ideal specification of export supply function given above has, however, to reckon with certain practical problems. First of all, there is no time series data on domestic cost available for India. However, one can construct a unit labour cost index for the manufacturing sector which could fairly represent the unit total factor cost in a relatively labour-intensive manufacturing sector of India. It is reasonable to assume that movements in domestic cost are reflected in the movements in domestic price. This was tested for the Indian case by regressing the logarithms of unit labour cost (ULC) in India's manufacturing sector[8] on the logarithms of manufacturing domestic price [HPM (wholesale price index)] for 1967 to 1985 and found a close positive relationship between the two (R^2 = .96). This intimate relationship between domestic price and cost would imply in turn a mulicollinearity problem if they are retained simultaneously in the export supply function for estimation. Therefore, we would better drop the cost variable altogether from the export supply function and leave the domestic price to perform a dual function. In other words, the gap between export price and domestic price, i.e. (XP-HP), will capture both the absolute and relative profitability of exports. This procedure is now fairly standard as indicated by the recent survey of trade studies by Goldstein and Khan (1985, pp. 1047-8).

The next variable in the export supply function is KF, fixed capital stock, which represents the productive capacity of the economy; the larger the productive capacity of the economy the higher the capacity for export production as well. Ali (1984) used capital-output ratio as the capacity variable in the estimation of export supply function for India on the grounds that it represents the capital-deepening process of industrialization which in turn implies the possibility of producing and exporting more sophisticated goods. Other proxies of capacity include trend in real national income (see Goldstein and Khan, 1978; and Moran, 1989), trend in industrial production (see Gupta, 1980), deviations from trend of real domestic output (see Coes, 1981; and Bond, 1985). The criticism against these proxies of capacity in an export supply function which are employed in the absence of data on capital stock is that, they do not fit well with an approach consistent with production function which we have adopted following Holly and Wade.

Finally, the exchange risk variable R, appears with a negative coefficient as exchange risk constitute an additional cost to the international firm. In an earlier chapter we did explain the exchange risk effect on export supply diagrammatically through a backward shift of supply curve.

Following the discussion above we rewrite the general export supply function by excluding the domestic cost variable as:

$$(3) \quad XQ_S = \alpha_S + \beta_S(XP\text{-}HP) + \gamma_S KF + \delta_S HA + \epsilon_S R$$

The above supply function assumes that export supply responds to changes in all explanatory variables within a single time period which is a year in our study. This is unrealistic. There are different ways in which disequilibrium behaviour can be introduced such as through the partial adjustment mechanism employing the 'Koyck' transformation or by assuming a polynomial (Almon) lag structure. In fact, the modelling of the length and pattern of lags in economic relationships is one of the unsettled issues in econometrics.

The partial adjustment model although simple is criticised for its highly restrictive nature in assuming a uniform length and pattern (geometrically declining) of lag for all the exogenous variables in the equation. For example, it is highly improbable that the pattern and length of lag in response of exports to a change in relative price is the same as for a change in capacity variable. Although polynomial lags are more flexible than the Koyck lags, the resulting dynamics of the system depends on the degree of the polynomial, on whether end-point constraints are imposed and, if so, in what way, and on the number of lags introduced (see Goldstein and Khan, 1985, p. 1068). The application of Almon lag structure involves considerable searching and some element of arbitrariness in arriving at the final dynamic specification which becomes sometimes very difficult to justify on theoretical grounds.

A new methodology in econometrics is "cointegration".[9] The advantage of this technique is that it provides a systematic way of estimating both the long-run and short-run relationships among economic variables. However, we decided against the use of the cointegration technique for two reasons. Firstly, this approach has so far been employed in single equation models. Ours is a demand and supply model in which export volumes and prices are jointly determined by a given set of exogenous variables subject to cross equation restrictions of the structural equations. The precise meaning of co-integration is not yet clear in a demand and supply system (Holly and Wade, 1986, p. 20). Secondly, there is a limitation imposed by the availability of data. We have less than 20 observations and at least five to six explanatory variables for each equation. The discovering of the long-run and short-run relationships through the application of cointegration in this context is almost meaningless.

In the light of limitations of the commonly employed methods of introducing dynamic adjustment and also due to the inapplicability of the co-integration technique, we follow a simple procedure in our export supply equation to make it more realistic. We assume that export supply adjusts to changes in relative price and exchange risk variables with a lag of one year whereas it adjusts to changes in capacity and domestic demand pressure within the same year. With these assumptions the export supply function changes to:

$$(4)\ XQ_s = \alpha_s + \beta_{s1}(XP - HP) + \beta_{s2}(XP - HP)_{-1} + \gamma_s KF + \delta_s HA + \epsilon_{s1} R + \epsilon_{s2} R_{-1}$$

where $(XP\text{-}HP)_{-1}$ and R_{-1} are the lagged values of (XP-HP) and R respectively;

β_{s1} and β_{s2} are the elasticities with respect to current and previous years' relative prices respectively; ϵ_{s1} and ϵ_{s2} are the coefficients with respect to exchange risk in the current and previous years' respectively. The signs of the new parameters are expected to be:

$$\beta_{s1} > 0;\ \beta_{s2} > 0;\ \gamma_s > 0;\ \delta_s < 0;\ \epsilon_{s1} < 0;\ \text{and}\ \epsilon_{s2} < 0$$

Now we bring the demand and supply equations together. Solving the equations (1) and (4) together for equilibrium we get two reduced form equations, one for export volume (XQ) and the other for export price (XP):

$$(5)\quad XQ = \alpha_0 + \beta_1 (E + HP - FP^*) + \beta_2 WY + \beta_3 KF + \beta_4 HA + \beta_5 R + \beta_6 R_{-1} + \beta_7 (XP-HP)_{-1}$$

$$(6)\quad XP = \alpha_1 + \gamma_1 (FP^* - E) + \gamma_2 WY + \gamma_3 HP + \gamma_4 KF + \gamma_5 HA + \gamma_6 R + \gamma_7 R_{-1} + \gamma_8 (XP-HP)_{-1}$$

where

$$\alpha_0 = \alpha_s + \frac{\beta_{s1}(\alpha_s - \alpha_d)}{\beta_d - \beta_s} \qquad \alpha_1 = \frac{\alpha_s - \alpha_d}{\beta_d - \beta_{s1}}$$

$$\beta_1 = \frac{-\beta_{s1}\beta_d}{\beta_d - \beta_{s1}} < 0 \qquad \gamma_1 = \frac{\beta_d}{\beta_d - \beta_{s1}} > 0$$

$$\beta_2 = \frac{-\beta_{s1}\gamma_d}{\beta_d - \beta_{s1}} > 0 \qquad \gamma_2 = \frac{-\gamma_d}{\beta_d - \beta_{s1}} > 0$$

$$\beta_3 = \frac{\gamma_s \beta_d}{\beta_d - \beta_{s1}} > 0 \qquad \gamma_3 = \frac{-\beta_{s1}}{\beta_d - \beta_{s1}} > 0$$

$$\beta_4 = \frac{\beta_d \delta_s}{\beta_d - \beta_{s1}} < 0 \qquad \gamma_4 = \frac{\gamma_s}{\beta_d - \beta_{s1}} < 0$$

$$\beta_5 = \frac{\beta_d \epsilon_{s1} - \beta_{s1} \delta_d}{\beta_d - \beta_{s1}} < 0 \qquad \gamma_5 = \frac{\delta_s}{\beta_d - \beta_{s1}} > 0$$

$$\beta_6 = \frac{\beta_d \epsilon_{s2}}{\beta_d - \beta_{s1}} < 0 \qquad \gamma_6 = \frac{\epsilon_{s1} - \delta_d}{\beta_d - \beta_{s1}} \gtrless 0$$

$$\beta_7 = \frac{\beta_{s2} \beta_d}{\beta_d - \beta_{s1}} > 0 \qquad \gamma_7 = \frac{\epsilon_{s2}}{\beta_d - \beta_{s1}} > 0$$

$$\gamma_8 = \frac{\beta_{s2}}{\beta_d - \beta_{s1}} < 0$$

One advantage of the reduced form approach is that we are able to get an export quantity equation with real effective exchange rate (REER) as one of the explanatory variables (second term in equation 5) and an export price equation with foreign price in domestic currency (FP) as one of the explanatory variables (second term in equation 6). The former enables us to straight away estimate the export volume impact of an exchange rate depreciation. The latter, together with the former, enables us to estimate the full export value effect of an exchange rate depreciation.

The derivation of the export price equation in the above manner has another major advantage. We note that the equation has foreign price in domestic currency (FP) and domestic price (HP) as two exogenous variables. The estimation of this equation for both manufacturing and primary product exports will enable us to comment on the comparative power of India's exporters over the export price of these two groups of products.

Next, let us examine the coefficients of the focus variable, exchange risk, in both volume and price equations. In the volume equation (equation 5) the sign of exchange risk elasticity is negative in both current and previous years, reflecting the unidirectionally negative effect of exchange risk from both demand and supply sides. However, with regard to the price equation (equation 6) the sign of the risk elasticity is indeterminate for the current year and positive for the previous year. It can be seen that the sign of the current year elasticity of exchange risk in the price equation depends on the comparative importance of supply and demand influences: if the supply effect dominates the demand effect, the sign of the risk elasticity will be positive and if the demand effect dominates the supply effect the sign will be negative. This is explained further below.

Exchange rate uncertainty imposes additional cost on the supplier and disutility on the demander leading to a decline in both supply and demand. This in turn implies a higher supply price and lower demand price for exports in comparison with a zero or low exchange risk situation. If the supplier bears a larger share of the burden of exchange risk than the demander, then the export price will rise. If, on the other hand, demander bears a larger proportion of the risk burden, then export price will fall. For a given level of exchange rate instability between the currency of the demander and the supplier, the burden of exchange risk borne by each depends on the currency invoicing of trade. If exports are invoiced in exporter's currency, then the exporter completely escapes the exchange risk as there is no uncertainty of export proceeds in terms of exporter's domestic currency and, therefore, the exchange risk falls completely on the importer. Instead, if exports are denominated in importer's currency then the importer is completely free from exchange risk and the risk burden falls entirely on the exporter. In the former case, the export price is bound to decline and in the latter export price is bound to rise.

Turning to the lag effect of exchange risk on export price, why is it positive? We had earlier stipulated that the demand effect is felt only in the current year but supply effect would linger on into the second year. If this assumption is correct, then the coefficient of the lagged risk variable in the export price equation will be positive.

Finally, we need to note the significance of the lagged difference between export price and domestic price, $(XP - HP)_{-1}$, in both export volume and price equations. To the extent that we expect a positive lagged response of export supply to relative price (see equation 4) the coefficient of $(XP\text{-}HP)_{-1}$ is expected to have a positive sign in the volume equation (equation 5) and a negative sign in the price equation (equation 6). The coefficient of this variable has to be taken into account in order to compute the long-run effect of real exchange rate on export volume. Similarly, the coefficients of $(XP\text{-}HP)_{-1}$ has to be taken into account in order to compute the long-run effect of domestic price on export price. It may also be noted that the price equation could be a partial adjustment model with the lagged dependent variable appearing on the right hand side.

9.4 Data Construction

The World Tables 1987 of World Bank (Fourth Edition) is the basic source of data on export volume (XQ), export price (XP) and real domestic absorption (HA). We have from the World Tables India's aggregate exports, manufacturing product exports and non-fuel primary product exports in current U.S. dollars as well as their corresponding export price indices. We estimated export volume indices by deflating the dollar value exports by their respective dollar-based export price indices. We thus arrived at export volume numbers for the aggregate (XQT), manufacturing products (XQM) and non-fuel primary products (XQP).

We generated domestic currency export price indices for aggregate exports (XPT), manufacturing exports (XPM) and for non-fuel primary products (XPP) by adjusting the U.S. dollar-based indices by the annual exchange rate conversion factor also supplied in the World Tables.

A limitation of data is that,whereas trade data are on calender year basis, domestic absorption (HA) data are on fiscal year (April-March) basis. Thus we had to treat the HA figure for 1968-69 fiscal year as pertaining to calender year 1968, and so on.

Fixed capital stock (KF) is also constructed on a fiscal year basis (end of the year). We have the fixed capital stock as on 31st March, 1971 on 1970-71 rupee prices prepared by the Central Statistical Organisation, Government of India [Report of the Working Group of Savings, 1982, p. 114]. This is taken to be for 1970 calender year and the series is constructed backward till 1968 and forward up to 1986 by subtracting and adding respectively the net real fixed capital formation for the corresponding years.

While construction of the total fixed capital stock series is easy, what we really need is the capital stock series for the primary sector, manufacturing sector, and the aggregate for these two sectors combined. Fortunately, disaggregated capital stock figures are available for the bench mark period ending 31 March 1971 from the same source quoted above. The disaggregated depreciation rates are estimated for the bench mark year again by the Central Statistical Organization and given in the same document. We applied these rates (2.37 per cent and 4.57 per cent of fixed capital stock for primary and manufacturing sectors respectively) throughout the sample period on the gross capital formation figures of the disaggregated groups available from National Accounts Statistics, Central Statistical Organization, Government of India, and built up the fixed capital stock series for the primary sector (KFP) and the manufacturing sector (KFM). The capital stock for both primary and manufacturing sectors combined are computed as the weighted average of KFP and KFM with weights given by the average share of primary products and manufactured products in India's total exports during 1979-81. Their weights worked out to be .359 for KFP and .641 for KFM.

The procedure for the construction of the real effective exchange rate indices (REER) was laid down in Chapter 7. However, for this study we estimated an 11-country export-weighted real effective exchange rate series against the 11-country modified trade-weighted index in Chapter 7. These eleven countries, which are the same used for the index in that chapter accounted for about 58 per cent of India's exports to convertible currency area during 1979-81.[10] The export-weighting system is estimated on the basis of the share of the eleven countries in India's aggregate exports during 1979-81 which are obtained from IMF's Direction of Trade Statistics, Yearbook, 1986. The countries included in the weighting system along with their respective weights are given below in Table 9.1.

Table 9.1 Export Weighting in Computation of the Real Effective Exchange Rate of Rupee

Country	Export Weights
1. U.S.	.245
2. Japan	.200
3. U.K.	.145
4. Germany	.115
5. Italy	.055
6. Netherlands	.057
7. France	.053
8. Belgium	.046
9. Australia	.032
10. Canada	.020
11. Switzerland	.032
Total	1.000

The computation of the REER involves computation of nominal effective exchange rate (E), domestic price (HP) and foreign price (FP*). We computed E and FP* separately as 11-country export-weighted indices. The former required eleven bilateral rates and the latter the wholesale price indices of the eleven countries. The eleven rupee rates are generated from dollar rates given in IMF's International Financial Statistics (IFS), the detailed procedure of which was explained in Chapter 7. HP is taken as the wholesale price indices of India. FP* and HP are both culled out from IMF's IFS, Supplement on Price Statistics, 1981 and 1986, as well as some past and recent individual monthly issues of IFS.

In fact, the REER series computed in the above-mentioned way is relevant only for estimating the aggregate export equation. The series has to be different for the two disaggregated export functions. However, as explained in

Section 9.3, foreign prices of competing final goods or intermediate products could be represented by the foreign wholesale price indices irrespective of the export group. But regarding the domestic price we used the wholesale price indices for manufactured products group (HPM) in the construction of the real effective exchange rate relevant for manufactured product exports (REERM) and the wholesale price indices for primary commodity group (HPP) in the construction of real effective exchange rate relevant to primary product exports (REERP). The wholesale price indices for the disaggregated groups are obtained from Economic Survey, Government of India, various issues. One limitation of this data is that they are on financial year basis.

Foreign price in domestic currency (FP) involves both foreign price (FP*) and nominal effective exchange rate (E). The separate computation of both were explained earlier.

The construction of real exchange risk proxies appropriate for India's exports constitutes a major task. We did compute eight different measures of exchange risk, consisting of both nominal and real measures for the analysis in Chapter 7. For the purpose of the study in this chapter we constructed four real exchange risk proxies. Here we used export weighting instead of modified trade weighting used in Chapter 7. The export weights are the same indicated in Table 9.1. The four alternative real exchange risk proxies are (1) real effective variation based on standard deviation of percentage changes (REV1), (2) real effective variation based on mean of absolute percentage changes (REV2), (3) variation of real effective exchange rate based on standard deviation of percentage changes (VREER1), and (4) variation of real effective exchange based on mean of absolute percentage changes (VREER2). REV1 is the most preferred exchange risk measure for India because firstly, it is consistent with the geographically undiversified nature of India's individual exporters and secondly, it is based on a more realistic expectation hypothesis. VREER1 is the conventional measure employed in a number of previous studies on both developed and developing countries. We insist that while this measure could be a reasonable proxy for exchange risk in developed countries where individual traders could be well diversified, it cannot capture the exchange risk situation in developing countries in a satisfactory way. Please recall from Chapter 7 that the exchange risk measures are computed for each month on a moving basis making use of observations of the past 12 months and averaged for the calender years, 1968-87.[11]

One limitation of the various exchange risk measures we constructed is that they do not distinguish between the two disaggregated export sectors. This is due to the fact that we did not have a consistent monthly series on manufacturing and primary commodity prices for the entire period of our study. Therefore we had to apply the same overall real exchange risk proxies for the estimation of export functions of the disaggregated groups as well.

World real income (WY) is estimated as an export-weighted real income index of three groups of countries: (1) developed market economies, (2) developing market economies and (3) centrally planned economies. The weights are the share of the three sets of countries in India's aggregate exports over the period 1979-81 and is based on data from IMF's Direction of Trade Statistics, Yearbook 1986. They are .494 for the first country group, .318 for the second, and .188 for the last. Real income for these separate country groups are obtained from the U.N. National Accounts Statistics, various issues. However, it may be noted that whereas for the first two groups real GDP numbers are used for the third group Net Material Product (NMP) alone is available.

We, in fact, wanted to extend the study backwards so as to benefit from a large sample, but could not undertake that mainly because of the massive devaluation of the rupee that occurred in June 1966. Although our sample starts in 1968, in the computation of exchange risk proxies we use the previous 12-month observations and thereby making 1967 the start of the basic period we used. We are aware that the use of data before 1967 would create bias in the exchange risk measures based on standard deviation due to the large discrete exchange rate change that took place in 1966.

9.5 Analysis of Exchange Risk

Fig. 9.1 maps out the annual average trends in rupee's export-weighted real effective variation during 1968-87 based on two measures, viz. the standard deviation of percentage changes (REV1) and the mean of absolute percentage changes (REV2). Fig. 9.2 gives similar trends in variation of export-weighted real effective exchange rate of the rupee (VREER1 and VREER2).

FIG. 9.1 EXPORT-WEIGHTED REAL

EFFECTIVE VARIATION OF RUPEE, 1968-87

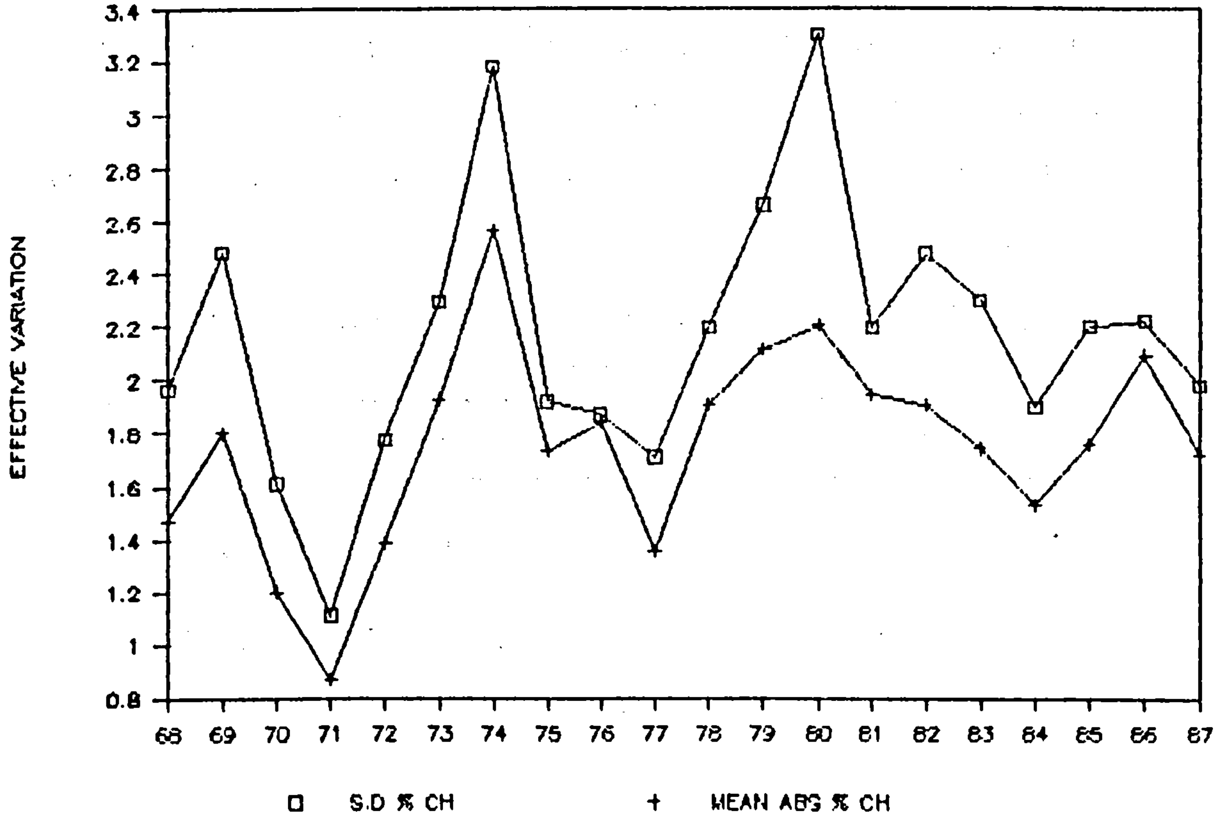


FIG. 9.2 VARIATION OF EXPORT-WEIGHTED

REAL EFFECTIVE RATE OF RUPEE, 1968-87

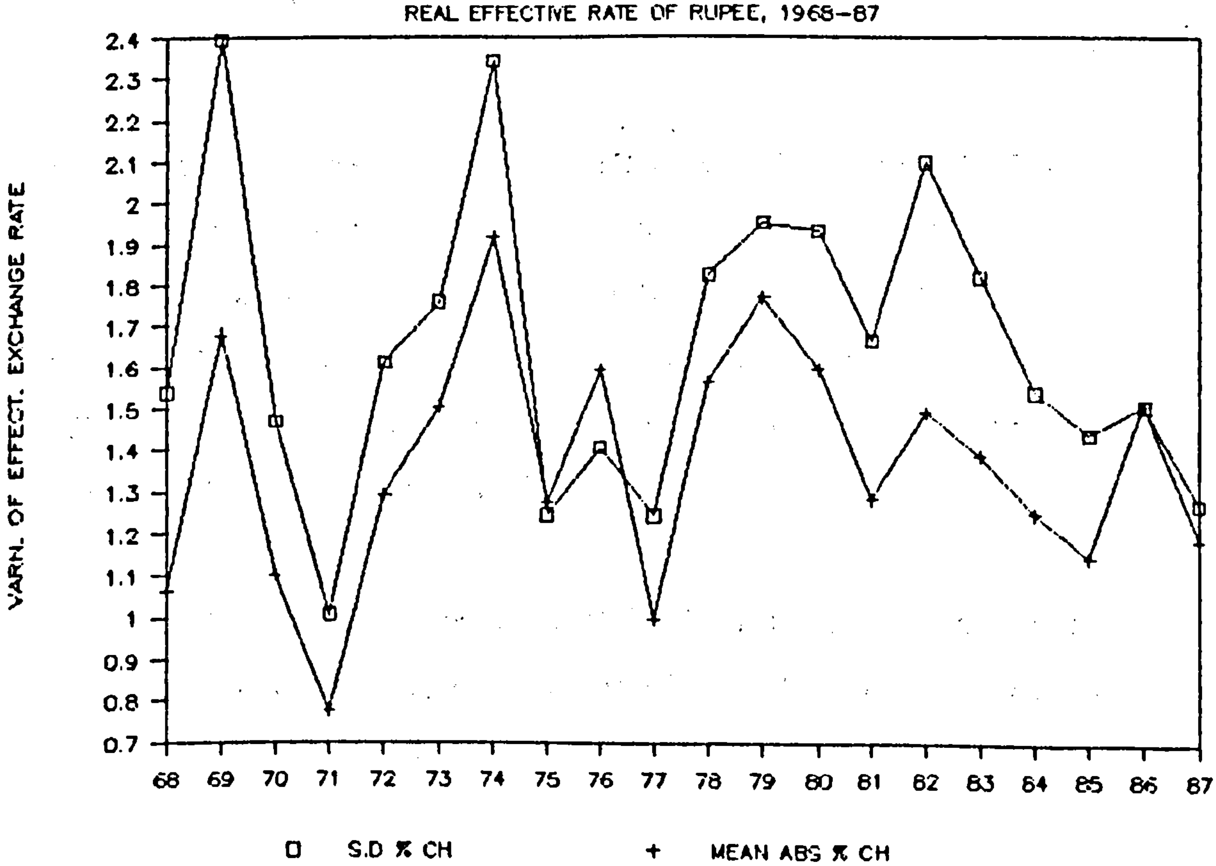


Table 9.2 brings out the correlation among the four real exchange risk values. It indicates a fairly high correlation (R = .90) between the two effective variation measures, REV1 and REV2 and a slightly lower correlation (R = .81)

Table 9.2 Correlation Matrix of Export-weighted Real Exchange Risk Measures, 1968-87[a]

	REV1	REV2	VREER1	VREER2
REV1	1.000			
REV2	.901	1.000		
VREER1	.813	.695	1.000	
VREER2	.816	.886	.814	1.000

a. Each measure is calculated monthly on a moving basis taking into account observations for the previous 12 months. The correlation matrix is, however, based on annual averages.

between the measures of variation of effective exchange rate, VREER1 and VREER2. The correlation between measures of effective variation and the corresponding measures of variation of effective exchange rate is lower for those based on standard deviation of percentage changes (i.e. R = .81 between REV1 and VREER1) than those based on mean of absolute percentage changes (i.e. R = .89 between REV2 and VREER2).

Table 9.3 brings out more statistical details of the four exchange risk measures. As expected, rupee's effective variation is higher than variation of effective exchange rate indicating negative covariance between bilateral rates.

Table 9.3 Mean, Standard Deviation and Coefficient of Variation of Real Exchange Risk Proxies, 1968-87[a]

Measure of Exchange Risk	Mean	Standard Deviation (SD)	Coefficient of Variation (%) (CV)
1. REV1	2.176	.518	23.8
2. REV2	1.734	.390	22.5
3. VREER1	1.672	.365	21.8
4. VREER2	1.376	.287	20.9

a. Each measure is computed monthly on a moving basis taking into account observations for the previous 12 months. The mean, S.D. and C.V. are, however, for the annual averages.

However, the coefficient of variation of exchange risk exhibit only marginal differences among the four measures with a slightly higher value for effective variation (23-24 per cent) than for variation of effective exchange rate (21-22 per cent).

It may be recalled that the exchange risk variable relevant for India's exports are the effective variation measures rather than the variation of effective exchange rate measures. The latter assume that there is ample scope for traders to substitute markets of low exchange risk for markets of high exchange risk. But in actual practice traders particularly in LDCs have very limited possibility to constantly shift between markets depending on the comparative currency risk. Nevertheless, we have retained the measures of variation of effective exchange rate, first because they are the conventional measures and second to see whether they make much difference to the results provided by the effective variation measures.

9.6. Estimation and Results

9.6.1 Estimation Procedure

Using OLS method, we estimated the quantity and price equations (Equation 5 and 6) for India's exports in the aggregate and also separately for the manufacturing and non-fuel product groups. The estimation proceeded in the following way. Each equation was estimated with the first exchange risk variable, REV1 and all other non-risk variables. Following the procedure of eliminating variables with low t-ratios one after another we arrived at the final specification. Then each of the other three risk variables was substituted in turn into the resulting specification for each equation. The final specification was tested against the general specification by employing F-test for joint restriction. The result of the final specification are also subject to parameter constancy tests. They were carried out for the last seven years of the sample by employing the Chow-test and also the forecast Chi^2-test. Depending upon the availability of degrees of freedom, additional tests for serial correlation by employing Box-Pierce (BP) statistic and Langrange-Multiplier(LM) statistic in their F-form were also done. We used PC-Give Dynamic Modelling Package for estimation and diagnostic tests. The results of the various diagnostic tests are reported along with each final specification.

9.6.2 Estimation Results

Tables 9.4 to 9.7 and also Tables 9.9 and 9.10 give the regression results involving our preferred exchange risk variable REV1. In each table, results from the general equation along with results from the final specification obtained by omitting variables with low t-ratios (generally below unity) are given. The results obtained by substituting other risk variables are, however, reported in Appendix Tables A9.1 to A9.6. We shall, first of all, examine the results of equations incorporating the first risk variable. Here we shall give attention to the coefficients of both exchange risk and non-risk variables. Later on we shall make a comparative analysis of exchange risk effects by bringing together results based on all risk measures.

a) Results from Aggregate Export Equations

Tables 9.4 and 9.5 report results from the estimation of aggregate export equations for volume and price respectively. The final specification of the aggregate volume equation indicates that real effective exchange rate (REER) world income (WY), domestic absorption (HA) and real exchange risk (REV1) significantly affect India's exports, whereas the price equation indicates that world price in domestic currency (FP), domestic price (HP) and fixed capital stock (KF) and real exchange risk (REV1) are important in determining domestic currency export price. All non-risk variables have the expected signs except for WY. WY appears with an unexpected negative sign in volume equation and that needs explanation. These final specifications fit the data well and also pass the diagnostic tests relating to serial correlation and parameter constancy. They also satisfy the test against the unrestricted model. The results indicate that the elasticity of export quantity with respect to REER is slightly above unity. Although the export price is positively influenced by both foreign and domestic prices, the elasticity with respect to the latter is unity while the elasticity with respect to the former is about half.

Table 9.4 Regression Results for Volume of Aggregate Exports (Sample Period: 1969-86)

General Equation:

$$XQT = \underset{(3.64)}{11.306} - \underset{(-4.11)}{1.153^{***}}\, REER - \underset{(-2.08)}{1.226^{*}}\, WY + \underset{(2.36)}{1.717^{**}}\, KF$$

$$- \underset{(-1.25)}{.839}\, HA + \underset{(.18)}{.015}\, REV1 - \underset{(-1.89)}{.127^{*}}\, REV1_{-1} + \underset{(.57)}{.234}\,(XPT\text{-}HP)_{-1}$$

$R^2 = .958$ SEE = .056 RSS = .0315 DW = 1.668

Final Specification:

$$XQT = \underset{(4.79)}{12.059} - \underset{(-5.03)}{1.209^{***}}\, REER - \underset{(-2.17)}{1.090^{*}}\, WY + \underset{(3.13)}{1.846^{***}}\, KF$$

$$- \underset{(-2.05)}{.987^{*}}\, HA - \underset{(-2.48)}{.143^{**}}\, REV1_{-1}$$

$R^2 = .956$ SEE = .052 RSS = .0326 DW = 1.622

Chow (7,5) = .63 Forecast Chi^2 (7) = 11.93

Test against unrestricted specification: $(F_2, 10) = .17$

*** significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values.

Table 9.5 Regression Results for Price of Aggregate Exports

General Equation (Sample Period: 1969-86):

$$XPT = -.817 + .479^{*}\,FP + .531\,WY + .809^{***}\,HP + .162\,KF$$
$$(-.42) \quad (2.01) \quad (1.06) \quad (4.28) \quad (.32)$$
$$-\ .559\,HA - .197^{***}\,REV1 + .038\,REV1_{-1} - .361\,(XPT - HP)_{-1}$$
$$(-1.36) \quad (-3.82) \quad (.69) \quad (-1.47)$$

$R^2 = .998$ SEE = .033 RSS = .0099 DW = 2.644

Final Specification (Sample Period: 1968-86):

$$XPT = -.619 + .534^{***}\,FP + 1.016^{***}\,HP - .492^{**}\,KF - .151^{***}\,REV1$$
$$(-1.59) \quad (4.04) \quad (6.00) \quad (-2.37) \quad (-3.51)$$

$R^2 = .997$ SEE = .037 RSS = .0194 DW = 2.220

BP (2,15) = 3.50 LM (1,13) = 1.02 Chow (7,7) = .43 Forecast Chi^2 (7) = 9.50

Test against unrestricted specification: F (4,9) = 2.16

*** significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values

Turning to the perverse sign of foreign real income elasticity of India's export volume, one explanation stems from Johnson's (1967) analysis of trade and economic growth. The point is that, the foreign export demand constitutes the balance between foreign production and foreign consumption and it is possible that changes in former can exceed changes in latter. (See Magee, 1975, pp. 188-190 for a mathematical illustration). This, however, assumes that the rise in world production is import-substituting. If the extra world production is export-oriented, then the world income coefficent could still be positive. The second explanation is, of course, offered by demand theory in relation to inferior goods. In spite of these theoretical possibilities, empirical evidence of a negative income elasticity of export demand has been scanty. One of the reasons for this, according to Magee (op. cit. p. 191), is the lack of candour among researchers to report such findings. Khan's (1974) study of developing country exports, however, did report a negative income elasticity of export demand for Indian aggregate exports but the coefficient was statistically insignificant.

Whatever be the theoretical reasons, we do not believe that there is a significant negative world income elasticity for India's exports. We suspect that our results are affected by multicollinearity.[12] In the present case, KF, WY and HA are highly collinear and we believe that this is instrumental in giving the perverse sign for the world income coefficient. By omitting KF from the export volume equation, the coefficient for WY become positive though insignificant, but that changes the sign and significance of HA. Omission of both KF and HA leads to a positively significant coefficient for WY, but that results in considerable decline in DW value implying the omission of relevant variables. By omitting HA alone, the coefficient of WY becomes negative though insignificant. The drastic step of dropping WY from the equation did not produce good results either, as this leads to the insignificance of HA though with the correct negative sign and to a low DW value. The results from these alternative specifications are reported in Appendix Table A9.7.

In the light of the defects of alternative specifications, in spite of the perverse sign of world income elasticity that specification has been retained.

Besides, the results from that specification satisfy the criteria of goodness of fit, absence of serial correlation, and parameter stability tests. Finally, the interval estimates for the income elasticity in the quantity equation at 95 per cent confidence level suggested the probability of positive values for the coefficient.

One result which remained consistent all through the estimation procedure for the aggregate export equations has been relating to the exchange risk. There is strong evidence of a negative impact of exchange risk on both the volume and price of India's aggregate exports, the former occurring with a one-year lag and the latter occurring within a year. This result does not appear to suffer from the problem of multi-collinearity as the exchange risk proxy is least correlated with other explanatory variables in the equation. In the final specification, exchange risk is significant at five per cent level in the quantity equation whereas it is significant at one per cent level in the price equation. The negative influence of exchange risk in the current year in the price equation indicates the dominance of demand influence over supply. This is elaborated in Section 9.3. Basically, the effect of exchange risk is to reduce both demand and supply. If the demand effect predominates, the export price will decline; if the supply effect predominates, export price will rise. Before making a detailed analysis of these results, let us examine whether they are corroborated by the results from the disaggregated equations.

b) Results from Manufacturing Export Equations

Table 9.6 gives the estimation results of manufacturing export quantity equation and Table 9.7 gives those of the correspondiong price equation. The final specification of the volume equation has two alternatives. The first one reports that manufacturing product exports are determined by real effective exchange rate(REERM), fixed capital stock (KFM) and real exchange rate uncertainty with a lag ($REV1_{-1}$), and second one reports that the significant variables in determining manufactured exports are REERM, WY and $REV1_{-1}$. Once again we confront the multicollinearity problem; the high intercorrelation between KFM and WY makes both appear insignificant if tried together, with a negative coefficient for the latter, but the omission of any one makes the other significant with the expected sign. Whereas KFM and WY are significant (at 10 per cent level) in separate specifications, REERM and $REV1_{-1}$ are strongly significant in all alternative specifications. The elasticity of volume of manufactured product exports with respect to REERM is well above unity. We have no reason in preferring one to the other of the two alternative specifications and, therefore, keep both. Either specifications give equally good results including parameter stability and the satisfaction of F-test for parameter restriction.

Table 9.6 Regression Results for Volume of Manufacturing Product Exports (Sample Period: 1969-86)

General Equation:

$$XQM = 10.896 - 1.394^{**} \; REERM - .181\; WY + .869\; KFM$$
$$(1.84)\;(-2.82) \qquad (-.17) \qquad (.43)$$
$$- .289\; HA + .075\; REV1 - .374^{*}\; REV1\text{-}1 - .293\; (XPM\text{-}HPM)_{-1}$$
$$(-.17) \qquad (.32) \qquad (-2.03) \qquad (-.41)$$

$R^2 = .862$ SEE = .131 RSS = .1723 DW = 2.105

Final Specification:

$$(1)\; XQM = 9.842 - 1.405^{***}\; REERM + .321^{*}\; KFM - .302^{**}\; REV1_{-1}$$
$$(3.99)\;(-3.61) \qquad (1.90) \qquad (-2.54)$$

$R^2 = .848$ SEE = .117 RSS = .1905 DW = 1.923

BP (2,14) = .75 LM (1,13) = 4.67 Chow (7,7) = .80 Forecast Chi^2 (7) = 4.77

Test against unrestricted specification: F (4,10) = .26

$$(2)\; XQM = 8.319 - 1.339^{***}\; REERM + .521^{*}\; WY - .297^{**}\; REV1_{-1}$$
$$(2.49) \quad (-3.09) \qquad (1.82) \qquad (-2.48)$$

$R^2 = .845$ SEE = .118 RSS = .1939 DW = 1.745

BP (2,14) =.33 LM (1.13) = .03 Chow (7,7), = .83 Forecast Chi^2 (7) = 3.15

Test against unrestricted specification: F (4,10) = .31

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values

Table 9.7 Regression Results for Price of Manufacturing Product Exports (Sample Period: 1969-86)

General equation:

$$XPM = \underset{(-.11)}{-.495} + \underset{(.58)}{.273}\,FP - \underset{(-.51)}{.602}\,WY + \underset{(2.85)}{1.015^{**}}\,HPM + \underset{(1.05)}{1.275}\,KFM$$

$$- \underset{(-.47)}{.440}\,HA - \underset{(-1.93)}{.255^{*}}\,REV1 + \underset{(.815)}{.103}\,REV1_{-1} - \underset{(-.96)}{.384}\,(XPM\text{-}HPM)_{-1}$$

$R^2 = .994$ SEE = .073 RSS = .0474 DW = 2.175

Final Specification:

$$XPM = \underset{(-6.10)}{-4.134} + \underset{(7.60)}{1.214^{***}}\,HPM + \underset{(2.04)}{.597^{*}}\,HA - \underset{(-1.77)}{.143^{*}}\,REV1$$

$$+ \underset{(2.62)}{.197^{**}}\,REV1_{-1}$$

$R^2 = .992$ SEE = .067 RSS = .0580 DW = 2.495

BP (2,14) = .54 Chow (7,6) = .90 Forecast Chi^2 (7) = 1.04

Test against unrestricted specification: F (4, 9) = .50

*** significant at one per cent level
** " five "
* " ten "

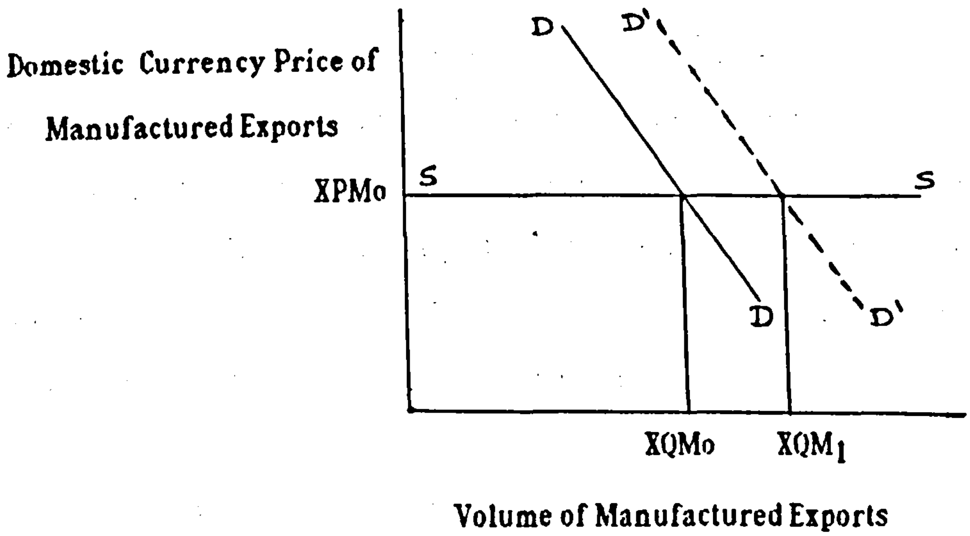
Note: Figures in parentheses are t-values

The price equation pertaining to manufactured product exports produces more conclusive results. As seen from Table 9.7, they indicate the dominance of domestic price (HPM) and domestic absorption (HA) and real exchange risk of the current year (REV1) and also previous year ($REV1_{-1}$). We have not been able to find evidence of the influence of foreign prices (FP) on India's manufacturing export price which is an extreme result which needs to be examined more closely. Regarding the effect of exchange risk, we get a negative coefficient for the current year and a positive one for the previous year. This points to the fact that demand forces prevail over supply in the first year and a strong supply influence in the second year. These results also require more detailed explanation.

Now let us, first of all, examine the effects of non-risk variables in the export price equation. FP is foreign price in terms of domestic currency and, therefore, has two components (1) average foreign price in terms of foreign currencies and (2) nominal effective exchange rate. The non-significance of FP in export price equation indicates that nominal exchange rate changes have no effect on export price (in domestic currency). But we saw from the results of manufacturing export volume equation that exchange rate changes do affect export quantity strongly. There appears to be a dichotomy between export quantity and export price here. The question can be posed this way: suppose there is a devaluation. Then, can it stimulate manufactured product exports without raising the domestic currency price of exports? This can occur if three conditions are satisfied simultaneously: (a) the foreign currency price of exports are reduced by the same extent of devaluation, (b) a downward sloping demand curve for exports, and (c) constant returns to scale in export production. This is illustrated in Fig. 9.3. below:

Fig. 9.3.

Market for Manufactured Exports



The diagram above presents the market for India's manufactured exports under certain extreme assumptions listed in the preceding paragraph. DD is the demand curve. It is downward sloping which means that given the exchange rate, India can export more by lowering the export price. SS is the export supply curve. This is a horizontal line which indicates constant returns to scale. The initial equilibrium quantity and price of exports are given by XQM_0 and XPM_0 respectively. A devaluation of the exchange rate is indicated by a rightward shift of the demand curve from DD to D'D'. As a result, volume of exports increases from XQM_0 to XQM_1 while export price remains at XPMo.

The illustration above of the export price behaviour, as thrown up by the regression results, depends crucially upon the assumption of infinite elasticity of export supply in manufacturing sector which is hard to believe in the context of India. We suspect that the regression results of the export price equation do not indicate a significant exchange rate effect because that effect is captured by the manufacturing domestic price (HPM) which is another argument in that equation. This is quite possible as there is likely to have a causal relationship between exchange rate and domestic manufacturing price.

In order to have an idea of the separate effect of exchange rate on export price of manufactured products, which is believed to be concealed in the domestic price of manufactured products, we thought it necessary to specify a manufacturing domestic price equation which includes, among other variables, an exchange rate variable. We now turn to the task of specifying and estimating such an equation in the section below.

A Domestic Manufacturing Price Equation for India.

Modelling of manufacturing price behaviour in India cannot ignore the crucial agriculture-industry linkage that exists in the Indian economy. Although declining, agriculture accounts for a considerable share of raw materials for the Indian industry.[13] More importantly, agricultural production constitutes over 60 per cent of the industrial workers' family budget.[14] Because of these factors, the variable cost in the Indian manufacturing sector is significantly dependent on the agricultural supply situation. An adverse supply shock in agriculture, for example, triggers off inflationary expectations in the economy which encourages hoarding and thereby pushes up raw material prices for the ago-based manufacturing sector and also wage costs in the entire manufacturing sector. The Indian manufacturing sector also depends heavily on imports for meeting the requirements of raw materials, components and machinery. Therefore, manufacturing costs are also influenced by import price. Based on these considerations we can specify the domestic manufacturing price equation as follows:

$$\ln HPM = a + b_1 \ln AS + b_2 \ln AS_{-1} + c_1 \ln IP + c_2 \ln IP_{-1} + dT$$

where HPM = manufacturing domestic price (wholesale price index)

AS = agricultural production index[15]

IP = import price index (in domestic currency)[16]

T = trend

It might seem that we have followed a pure supply-side approach to price determination here. A number of empirical studies on inflation in India have not been able to detect a significant role for demand including money supply. (e.g., Aktar, 1975; Rana and Dowling, 1983; Saini, 1982 and 1984; and Chatterji, 1985). A recent study by Madhur and Roy (1986), however, demonstrated the influence of demand factor (capacity utilization) in determining industrial prices in India within the framework of a 'mark-up' model. In our model, the T-variable, while statistically justified by the existence of trends for all variables in the model (see Maddala, 1988, p. 104), will inevitably pick up the trend component of all influences on manufacturing price which are not included in the equation, particularly the demand variables like the money supply.

The manufacturing price equation has been estimated for the sample period 1968-86 (annual data) and the results are given in Table 9.8 on the next page.

Table 9.8 Regression Results of Manufacturing Price Equation (Sample Period: 1968-86)

$$\ln HPM = \underset{(4.48)}{6.548} - \underset{(-1.58)}{.292} \ln AS - \underset{(-2.04)}{.389^{*}} \ln AS_{-1} + \underset{(3.63)}{.265^{***}} \ln IP$$

$$- \underset{(-2.18)}{.152^{**}} \ln IP_{-1} + \underset{(7.54)}{.084^{***}} T$$

$R^2 = .995$ SEE = .036 RSS = .017 DW = 1.666

BP (2,15) = 1.03 Chow (7,6) = .44 Forecast Chi^2 (7) = 2.18

*** Significant at one per cent level of significance
** " five "
* " ten "

Note: Figures in parentheses are t-ratios.

The results are satisfactory and in tune with the theory we explained earlier. Specifically, the import price elasticity indicates that a 10 per cent devaluation would lead to only 1.1 per cent rise in manufacturing prices within two years. The impact is much larger at 2.6 per cent in the first year but declines in the second year, possibly due to the additional import-substituting domestic production induced by devaluation.

The purpose of estimating the manufacturing price equatiion has been to establish the possibility of exchange rate changes affecting the domestic currency price of export price of India's manufactured product exports. We were unable to disentangle that effect from the effect of domestic manufacturing price because of the strong causal relationship between exchange rate and manufacturing price in India. By substituting the results of

HPM equation in XPM equation results in Table 9.7, we get the long-run export price elasticity with respect to FP as .137 with a much higher short-run elasticity of .322. This removes the dichotomy between export price and export quantity we noted in the regression results of manufacturing export equations.

Nevertheless, the results lead us to believe that Indian manufactured product exporters have substantial power over the export price. They are mostly price-setters rather than price-takers. There is thus evidence to state that India's manufactured exports are differentiated products rather than standardized products for which there exist perfect international substitutes. Domestic cost and price and, to some extent, domestic demand pressure influence the export price of India's manufactured exports. The foreign price including exchange rate do have some influence on India's export price particularly in the short run, but that effect is marginal in the long run.

c) Results from Non-fuel Primary Product Export Equation:

Table 9.9 reports the details of the results from primary export volume equation. Here too, we have two alternative final specifications: the first one with WY, and the second with capital stock (KFP) instead of WY. The results from the general equation indicate that, WY and KFP have expected positive coefficients but are both insignificant whereas they are significant if tried alone in separate equations. We again suspect multicollinearity to be responsible for this situation. We keep either specifications as they are equally good in all other respects.

One striking result from the primary product export quantity equation is that, the real effective exchange rate(REERP) while strongly significant in the first year with the expected sign, has that effect partially nullified in the second year by an unexpected negative sign on the lagged value of the difference between export price and domestic price, $(XPP - HPP)_{-1}$.[17] This may be explained as a 'stock-holding' effect. Although primary sector, particularly agriculture, is characterized by low price elasticity of production, there can be a large short run export response from this sector through drawing down of stocks. However, particularly with the dominance of tree crops in primary exports where the production response takes several years, a decline in exports can be expected in the second year as in response to an export price rise exports rise sharply in the first year by depleting inventories. Taking into account this typical behaviour of primary commodity exports, the long-run elasticity of exports with respect to real effective exchange rate works out to be less than unity. (.6 and .9 by the final specification alternatives one and two respectively, ignoring the sign). This compares with the larger elasticity of more than unity for manufactured product exports (1.3 and 1.4 respectively for the two alternative final specifications).

Another important result from the primary product export volume equation is that it gives evidence of a strong negative domestic absorption effect on primary product exports. This is indicated by each of the two final alternative specifications, although the value of the coefficient is strikingly different which may be attributed to multicollinearity. We could not detect any significant domestic absorption effect in the manufacturing export sector through the volume equation although some indirect evidence of it was noted through the manufacturing export price equation (see Table 9.7). As against this, it appears true to state that the Indian primary commodity exports are constrained by the fast growth in domestic absorption of exportables.

Table 9.9 Regression Results for Volume of Non-fuel Primary Product Exports

General Equation (Sample Period: 1969-86):

$$XQP = 15.244 - 1.457^{***}\ REERP + .558\ WY + .876\ KFP$$
$$\quad (4.06)\quad (-3.99) \qquad\qquad (.70) \qquad (.70)$$

$$- 1.688\ HA - .010\ REV1 + .039\ REV1_{-1} - .669^{*}\ (XPP - HPP)_{-1}$$
$$(-1.71) \qquad (-.11) \qquad (.47) \qquad (-2.11)$$

$R^2 = .881$ SEE = .073 RSS = .0527 DW = 2.310

Final Specification (Sample Period: 1968-86):

$$(1)\ XQP = 14.347 - 1.449^{***}\ REERP + 1.120^{***}\ WY - 1.105^{***}\ HA$$
$$\quad (5.12)\quad (-4.85) \qquad\qquad (4.02) \qquad\qquad (-4.34)$$
$$- .818^{***}\ (XPP - HPP)_{-1}$$
$$(-3.65)$$

$R^2 = .884$ SEE = .064 RSS = .0574 DW = 2.163

BP (2,15) = .49 LM (1,13) = .15 Chow (7,7) = 2.09 Forecast Chi^2 (7) = 5.62

Test against unrestricted specification: F (3,10) = .30

$$(2)\ XQP = 16.283 - 1.510^{***}\ REERP + 1.622^{***}\ KFP - 2.079^{***} HA$$
$$\quad (5.49)\quad (-4.71) \qquad\qquad (3.44) \qquad\qquad (-3.75)$$
$$- .563^{**}\ (XPP - HPP)_{-1}$$
$$(-2.33)$$

$R^2 = .865$ SEE = .069 RSS = .0671 DW = 1.800

BP (2,15) = .39 LM (1,13) = .00 Chow (7,7) = 1.75 Forecast Chi^2 (7) = 11.62

Test against unrestricted specification: F (3,10) = .91

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values.

Why is is that the domestic absorption effect is evident more in the case of India's primary product exports than for her manufactured product exports? We feel that, for manufactured products the domestic absorption effect on exports is picked up by the domestic price which is included in the REERM; the higher the domestic price the higher the REERM and, therefore, lower the manufactured product exports. In the case of primary products, the domestic absorption effect is more direct without the intermediate channel of rising domestic price. This is quite possible. Firstly, primary commodities are used up internally through rise in domestic investment as firms become more aware of the larger potential profits from domestic manufacturing than from exporting primary raw materials (e.g., animal skin and raw leather, raw cotton, tobacco and iron ore). Secondly, rises in overall domestic consumption imply larger domestic market for consumable items including exportables (e.g., tea, coffee, sugar and spices). In both these cases, the firms find the domestic market more secure and certain than the world market and hence prefer the former to the latter even without a positive price differential. This is more so in the case of primary commodities than for manufactured products which is consisent with the empirical findings of high short-term fluctuations and long-term decline in the terms of trade of primary commodities.

Another interesting finding relating to India's primary exports is that there is no evidence of a negative exchange risk effect on the volume of exports. This is in sharp contrast to the results in the manufacturing sector where we found evidence of a strong negative effect taking place with a lag. This, however, is in tune with the low price-elasticity of supply we noticed in the primary sector in comparison with the manufacturing sector.

Let us now turn to the primary commodity export price equation, the results of which are shown in Table 9.10. These results are coherent with the quantity equation results. First of all, we find a short-run foreign price effect which becomes stronger in the long run; the elasticity coefficient rises from .55 in the short run to 1.09 in the long run. On the other hand, the elasticity of export price with respect to domestic price of primary products is near unity in the short run and remains almost at that even in the long run. Thus, we find that primary commodity export prices are influenced by both domestic and foreign prices although in the short run the domestic price is more dominant than the foreign price. Consequently, we cannot believe that even for primary commodities, India is a price-taker.

The importance of domestic factors in determining the export price of India's primary product exports is also demonstrated by the significant elasticity coefficient of capital stock in the export price equation (Table 9.10). It implies that the rise in productive capacity of the Indian primary commodity sector has a large depressing effect on the export price that can be realized.

The high negative export price effect of capital stock growth in the primary commodity sector is an important result. Bhagwati (1958) and Johnson (1955) first noted the paradox of "immiserizing growth" in which an expansion of domestic productive capacity leads to an external terms of trade loss which outweigh the initial gain from increased production. Our results are pointing to such a possibility in the context of India's primary commodity exports.

Table 9.10 Regression Results for Price of Non-Fuel Primary Product Exports

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General Equation (Sample Period: 1969-86):

$$XPP = \underset{(.29)}{1.080} + \underset{(1.50)}{.687\,FP} - \underset{(-.30)}{.328\,WY} + \underset{(2.49)}{1.049^{**}\,HPP} - \underset{(-.81)}{1.127\,KFP}$$

$$- \underset{(-.03)}{.029\,HA} - \underset{(-2.01)}{.193^{*}}\ REV1 - \underset{(-.65)}{.070\,REV1_{-1}} + \underset{(1.61)}{.480\,(XPP - HPP)_{-1}}$$

$R^2 = .988$ SEE $= .068$ RSS $= .0418$ DW $= 2.156$

Final Specification (Sample Period: 1968-86):

$$XPP = \underset{(-.24)}{-.352} + \underset{(1.96)}{.546^{*}\,FP} + \underset{(3.13)}{.980^{***}\,HPP} - \underset{(-3.13)}{1.022^{***}\,KFP}$$

$$- \underset{(-2.55)}{.184^{**}\,REV1} + \underset{(2.37)}{.498^{**}\,(XPP - HPP)_{-1}}$$

$R^2 = .990$ SEE $= .058$ RSS $= .0440$ DW $= 1.969$

BP $(2,15) = .29$ Chow $(7,6) = 1.63$. Forecast Chi^2 $(7) = 2.03$

Test against unrestricted specification: $F(3,9) = .16$

Long-run Results:

$XPP = .701 + 1.088\,FP + .960\,HPP - 2.036\,KFP - .367\,REV1$

*** significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values

Finally, we turn to the effect of exchange rate uncertainty on primary commodity export price. We detect a significantly negative effect which becomes larger in the long run. As is clear from theoretical discussion, this indicates the powerful demand effect gaining over the weak supply effect. A similar effect was also noticed in the aggregate export price equation results. In the case of manufacturing export price, although we found similar negative effect in the short run that was more than offset by a positive effect (coming from the supply side) in the long run (Table 9.7). We need to examine closely the exchange risk effect on export price. Before doing that, let us see whether the exchange risk results obtained by employing a single measure of exchange risk, i.e. REV1, are robust across the other alternative measures. To this task we turn next.

d) Exchange Risk Results - Alternative Measures Compared

Table 9.11 allows examination of the specific risk effects as revealed through the different exchange risk measures within the framework of separate aggregate and disaggregated export equations. All four risk measures indicate more or less similar results, i.e., a depressing effect of exchange risk on export volume, both for the aggregate and manufactured products which occur with a lag; and a depressing effect on export price, both for the aggregate and primary products, the former occurring within a year and the latter extending over more than a year, and a long-run positive effect on export price of manufactured products. In addition, all four measures indicate that primary commodity export volume is virtually free from any exchange risk effect. It can also be seen from Table 9.11 that whereas the risk results indicated above are significant or nearly significant by the first three measures, they are not significant through the last measure, namely, VREER2.

Table 9.11 Exchange Risk Elasticities and t-Ratios

Risk Variable	Export Volume			Export Price		
	Aggregate	Manufacturing	Primary	Aggregate	Manufacturing	Primary[a]
1. REV1						
Current	-	-	-	-.151***	-.143*	-.184**
				(-3.51)	(-1.77)	(-2.55)
Lagged	-.143**	-.302**	-	-	.197**	-.183
	(-2.48)	(-2.54)			(2.62)	
2. REV2						
Current	-	-	-	-.153**	-.071	-.188**
				(-2.68)	(-.73)	(2.20)
Lagged	-.127	-3.07**	-	-	.212**	-.121
	(-1.77)	(-2.34)			(2.30)	
3. VREER1						
Current	-	-	-	-.106**	-.079-	-.146*
				(-2.24)	(-.89)	(-1.98)
Lagged	-.141**	-.315**	-	-	.140	-.132
	(-2.21)	(-2.42)			(1.60)	
4. VREER2						
Current	-	-	-	-.090	-.024	-.109
				(-1.54)	(-.22)	(-1.29)
Lagged	-.093	-.236	-	-	.137	-.069
	(-1.27)	(-1.68)			(1.24)	

*** Significant at one per cent level
** " five "
* " ten "

a. The lagged effect of exchange risk on the export price in the primary sector is computed by subtracting the short-run effect from the long-run effect. These cases imply a partial adjustment system with the lagged dependent variable appearing on the right hand side of the equation.

Considering the results only from the first three risk measures, we perceive a difference which distinguishes the first measure from the other two. That is, although all three measures indicate a negative effect on manufacturing export price in the current year, that effect is significant only with regard to the first measure. However, as implied from earlier discussion, all three measures agree with regard to the significant or nearly significant positive effect which the exchange risk has on manufacturing export price in the second year, which outweighs the negative effect in the first year.

In short, although REV1 and REV2 are theoretically superior to VREER1 and VREER2 as measures of exchange risk the overall conclusion of the effect of exchange risk on India's export volume and price is not much affected by the use of any one of these measures. The results are robust across at least three of the four measures we have constructed.

e) Exchange Risk Results - Further Analysis

From the discussion so far there has emerged a pattern in the export quantity and price effects of exchange risk in India. Is this pattern consistent with economic theory? We would like to highlight particularly the asymmetry in the effects as between manufacturing and primary sectors. The table below summarizes the quantity and price responses of a change in exchange risk separately from India's manufacturing and primary product exports:

Table 9.12 Exchange Risk Effects on India's Exports of Manufacturing and Primary Products

Export Group	Volume	Price
Manufacturing Products	Lagged	Quick demand effect Lagged supply effect
Primary Products	Nil	Prolonged demand effect

Table 9.12 makes qualitative statements on the impact of exchange risk on the volume and price of India's manufacturing and non-fuel primary product exports as thrown up by the econometric estimation detailed earlier. In the manufacturing sector, we note a lagged negative quantity response to exchange risk, an immediate negative effect on price which reflects the dominance of demand response, and a lagged positive price effect which is consistent with the lagged supply response. Turning to the primary sector, we see no significant volume response to exchange risk, and a negative prolonged price effect which also arises from the predominance of demand effect. We attempt to explain these effects below.

In fact, the above results are similar to those found in the pioneering work by Hooper and Kohlhagen (1978). These authors examined the exchange risk effects on trade between industrial countries within a short time-framework of two quarters and detected significant price effects but no significant quantity effects. Irrespective of whether the market is monopolistic or competitive, they demonstrated that the lack of quantity effect in the presence of a strong price effect is due to short-run price inelastic export supply (see Hooper and

Kohlhagen, op.cit. pp. 501-2). Our short-run results in the manufacturing sector and both short-run and long-run results in the primary commodity sector are similar to those of Hooper and Kohlhagen. In the long run, however, the supply of manufacturing exports responds to exchange risk. This is indicated by a fall in supply which in turn raises the export price of manufacuring exports.

Another major question is with regard to the sign of the export price effect. We found that it is negative for the manufacturing product exports in the short-run and negative both in the short and long run for the primary commodity exports. The negative price elasticity coefficient of exchange risk is corroborated by the aggregate price equation results (see Table 9.11). The explanation of the negative coefficient for exchange risk in the export price equation constitutes an important task to which we turn below.

Here too it was Hooper and Kohlhagen who for the first time systematically examined the sign of exchange risk coefficient in a trade price equation. They showed that the effect of exchange risk on trade price depends on the currency denomination of trade contracts. The analysis was done by these authors in the context of bilateral trade flows among industrial countries. They found significantly negative exchange risk coefficients in the price equations of U.S. exports and German exports and imports, and significantly positive coefficients in U.S. import equations. In the former case the explanation offered was that trade was invoiced predominantly in exporters' currency and therefore the exchange risk was largely on the importers' side which in turn depressed demand and thereby the price. In the latter case of U.S. imports, the trade was invoiced mostly in U.S. dollars implying larger risk on exporters which caused a rise in price. This was particularly noted in the case of U.S. imports from Japan which are predominantly dollar denominated.

Our study, unlike that of Hooper and Kohlhagen, is based on multilateral trade in which case several currencies are involved. Nevertheless, an examination of the invoicing pattern of India's exports should throw light on the issue. We give the average invoicing pattern of India's merchandise exports during 1979-80 to 1981-82 in the table on next page.

According to Table 9.13, first of all, 39.5 per cent of India's exports are designated in the Indian rupee. For this portion of India's exports, foreign importers bear fully the exchange risk. Indian exporters are free from exchange risk relating to this part of exports as their export receipts in domestic currency are unaffected by currency fluctuations. Another 44 per cent of the country's exports are invoiced in U.S. dollar. A part of this export, however, goes to the U.S. for which Indian exporters face full exchange risk. But as indicated in Table 9.13, India's exports to the U.S. denominated in dollar constitute only 9.4 per cent of her global exports during 1979-80 to 1981-82. Therefore, for the balance, i.e., 34.6 per cent of India's total exports that are invoiced in dollar, exchange risk is partly borne by Indian exporters and partly by non-U.S. importers of Indian exports. But who bears more risk for this portion of India's exports?

Table 9.13 Average Currency Invoicing Pattern of India's Merchandise Exports during 1979-80 to 1981-82

Currency	Share in Total Exports (%)
Indian rupee	39.5
U.S. dollar	44.0 (9.4)[1]
Pound sterling	12.2 (4.1)[2]
Deutsche mark	2.2
French franc	0.4
Swiss franc	0.2
Others	1.5
Total	100.0

1. India's dollar-denominated exports to U.S. as percent of India's global exports

2. India's pound-denominated exports to U.K. as per cent of India's global exports

Source: Computed from Reserve Bank of India Bulletin, January 1988.

To determine that, one has to compute the exchange risk involving the non-dollar currencies vis-a-vis the dollar and the exchange risk involving the rupee vis-a-vis the dollar. If the former is larger than the latter, then obviously the non-U.S. importers of dollar-invoiced Indian exports bear proportionately larger exchange risk than the Indian exporters; if the former is lower than the latter, then vice versa.

We computed, therefore, the average real effective variation of ten major foreign currencies against the U.S. dollar based on the measure of standard deviation of percentage changes. The procedure is similar to the one we employed for the calculation of real effective variation of the rupee, i.e., REV1. The currencies and the weighting system are similar except that the weights of ten non-dollar major currencies are normalized to equal unity as the dollar weight drops out. Table 9.14 compares the real effective variation of the non-dollar foreign currencies against the U.S. dollar with real variation of the rupee against the U.S. dollar for the period, 1968-86.

As can be seen from Table 9.14, although the risk relating to rupee vis-a-vis the dollar had been higher than that involving the 10 major non-dollar currencies vis-a-vis the dollar in the initial years up to 1972, in the subsequent years the rupee exchange risk had been generally lower. For the period as a whole, the risk involving the non-dollar currencies against the dollar had been about 18 per cent higher than that for the rupee. This gives evidence that for the bulk of India's dollar-denominated export trade, foreign importers bore a larger exchange risk than Indian exporters during the period under study.

Table 9.14 Real Exchange Risk Involving Rupee and Non-dollar Major Currencies against U.S. Dollar, 1968-86 (Average of Months)[a]

Year	Rupee vis-a-vis Dollar	Non-dollar Currencies vis-a-vis Dollar[b]
1968	1.754	1.326
1969	2.288	0.867
1970	1.292	0.866
1971	0.983	0.634
1972	1.621	1.132
1973	2.354	2.379
1974	3.498	3.762
1975	2.165	2.613
1976	1.864	1.766
1977	1.126	1.504
1978	2.058	1.790
1979	2.555	2.787
1980	2.205	4.068
1981	1.892	2.636
1982	0.912	2.777
1983	0.977	2.599
1984	1.020	2.075
1985	2.213	2.861
1986	2.044	2.600
Average (1968-86)	1.833	2.161

a. Based on 12-month moving standard deviation of monthly percentage changes

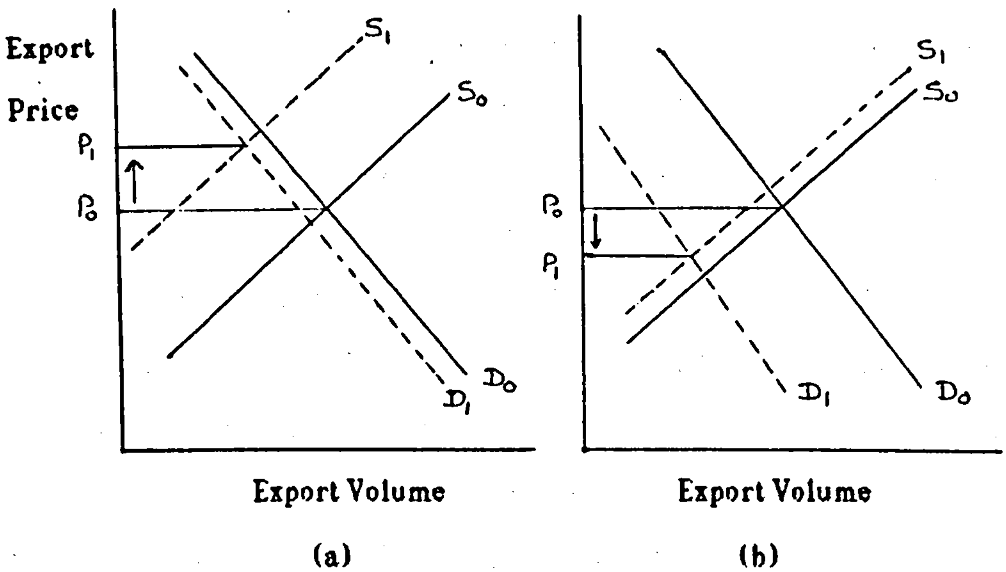
b. 10-country real effective variation with weights based on the share of India's exports to the respective countries.

The next major invoicing currency for India's exports is the pound sterling constituting on the average 12.2 per cent of total exports during 1979-80 to 1981-82 (Table 9.13). However, one-third of this portion pertains to India's exports to U.K. for which Indian exporters bear the full exchange risk. The balance, i.e., 8.1 per cent, relates to India's exports to non-U.K. countries for which the exchange risk is distributed between Indian exporters and importers.

The point that can be made from the above analysis of currency-invoicing pattern of India's exports is that nearly two-thirds[18] of the currency risk of India's export trade falls on importers and the Indian exporters bear only one-third of that risk. This quite clearly explains the negative exchange risk coefficient in India's export price equations. That is, exchange risk on importers of India's products depresses the demand for India's exports thereby forcing a cut in price. This is illustrated diagrammatically on next page.

Figs. 9.4 (a) and 9.4(b) demonstrate the exchange risk effect on export price in two contrasting cases of invoicing pattern: (a) invoicing of exports mostly in importers' currency and (b) export-invoicing mostly in domestic currency. In the former case, as depicted in Fig. 9.4 (a), the backward shift in supply curve due to the rise in exchange risk is larger than the backward shift in demand curve because the rise in risk falls proportionately more on exporters than on importers. The result is a rise in price. In the latter case, as seen in Fig. 9.4 (b), the backward shift in demand is larger than the backward shift in supply as exchange risk rises. This is so because importers bear a larger proportion of the rise in exchange risk than exporters. The result is a decline in price. It is this latter case that illustrates the Indian situation.

Fig. 9.4. Exchange Risk Effect on Export Price: An Illustration



Export invoicing dominated by importers' currency

Export invoicing dominated by exporters' currency

However, one should not overemphasize the importance of currency invoicing in determining the exchange risk effect. It appears that the pattern of currency invoicing strongly influences the distribution of exchange risk as between the demand and supply sides in the case of India' s non-fuel primary product exports. But its influence on manufacturing product exports is limited to the short run; in the long run, we have noted a positive export price effect of exchange risk in the manufacturing export sector which implies the outweighing of the short run negative effect arising from the currency invoing pattern. This result, however, is consistent with our argument in Chapter 6 that the cost of exchange risk could exist even in the presence of full-fledged forward market facilities.

f) Average Exchange Risk Cost on India's Exports

After having examined the general nature of the effect of exchange risk on

India's exports, volume and price, it is now time for quantifying the effect more precisely. If we multiply the negative of the value of risk elasticity by 100, that gives the percentage change in export volume/price that could have occurred during the entire period of study if exchange risk had dropped to zero from its average value (see Cushman, 1988). Perhaps it is unrealistic to expect a 100 per cent decline in exchange risk. A more reasonable line of enquiry would be to look for the percentage change in export volume/price that would have occurred if the average level of exchange risk had remained at the minimum value obtained during the period under review.[19] Let us call the former measure, exchange risk cost I and the latter, exchange risk cost II. We tabulate these two types of average cost of exchange risk based on three alternative risk measures[20] in Tables 9.15 and 9.16 respectively for manufactured product exports and primary product exports.

Tables 9.15 and 9.16 indicate that the average cost of exchange risk, as worked out through the three exchange risk measures, is more or less equal with respect to export volume but it varies somewhat with respect to export price for the different measures. As explained earlier, we prefer the first measure, REV1, as it is more realistic in the context of India. Therefore, we confine our discussion based on the results from that measure only. According to that measure, as we find from Table 9.15, the volume of India's exports of manufactured products would have <u>risen</u> by 30 per cent and their price <u>fallen</u> by 5 per cent during 1968-86 had there been no exchange risk in this period. Adding the volume and price effects together, we would have got an average increase of 25 per cent in the rupee export earnings from manufactured products in the absence of exchange risk during the period 1968-86. Taking a more realistic assumption, the rupee value of Indian manufactured exports would have been higher by nearly 12 per cent had the authorities kept the exchange risk to the minimum level obtained during 1968-86. This is not a small cost for India's manufactured exports.

Table 9.15 Average Exchange Risk Cost during 1968-86: Manufacturing Product Exports (Per Cent)

Risk Variable	Volume		Price		Value	
	Cost I	Cost II	Cost I	Cost II	Cost I	Cost II
REV1	30.2	14.8	-5.4	- 2.6	24.8	12.2
REV2	30.7	15.2	-14.1	- 7.0	16.6	8.2
VREER1	31.5	12.5	- 6.1	- 2.4	25.4	10.1

Table 9.16 Average Exchange Risk Cost during 1968-86: Primary Product Exports (Per Cent)

Risk Variable	Volume		Price		Value	
	Cost I	Cost II	Cost I	Cost II	Cost I	Cost II
REV1	-	-	36.7	17.9	36.7	17.9
REV2	-	-	30.9	15.3	30.9	15.3
VREER1	-	-	27.8	11.0	27.8	11.0

As far as the primary exports are concerned, as we saw earlier, there have been no volume effect of exchange risk. But there has been a large price effect. By our preferred measure, as can be seen from Table 9.16, export price or the value of India's non-fuel primary products would have risen by nearly 37 per cent during 1968-86 had there been no exchange risk. On the other hand, if the exchange risk had been restricted to the average minimum level achieved during the period, the rise in export export price/value would have been nearly

18 per cent. This indeed is quite substantial.

9.6.3 Comparison With Other Studies

There are two important previous studies on the impact of exchange risk on India's exports both of which are based on quarterly data. Gupta's (1980) study covers 1960-78 but omitted 1971 II - 1973 II through the dummy variable technique whereas Bautista's (1981) work covers a shorter period of 1974-79. A problem with Gupta's study is that it is based on only nominal exchange risk. This would not have been much of a problem had the study been confined to the floating rate period alone as Bautista's. This is so because, during almost two-thirds of the period of Gupta's study nominal exchange rate virtually remained unchanged, and this would have introduced a downward bias in risk coefficients. Secondly, Gupta used the SDR value of Indian rupee as the relevant exchange rate and thereby measured, at the most, variation of effective exchange rate and did not consider effective variation. Thirdly, Gupta relied mainly on two statistical measures of exchange risk, one, the mean absolute error and two, the root mean square error, both of which are based on static expectations[21] and ruled out the consideration of standard deviation measures. Fourthly, Gupta did not incorporate any dynamics in the export function which implied instantaneous adjustment of exports to changes in all explanatory variables which is quite unrealistic particularly with quarterly observations.

Bautista considered both nominal and real exchange risk but his final equation for India's exports had variation of only real effective exchange with a 12-country export-weighting system. It is to be noted, however, that the author used the standard deviation of real effective exchange rate as the exchange risk measure, and not the standard deviation of percentage changes in real effective exchange rate, which could have captured not only the short-term volatility but, unintentionally, a part of the long-term trend in exchange rate as well. Secondly, Bautista's study is based on dollar value of exports and, therefore, it does not separate out the quantity and price effects as we did. Besides, the specification of an export function in value terms rather than quantity can be questioned on the grounds that the elasticity coefficients of exports volume and price with respect to each exogenous variable could very well be different.

The two studies mentioned above can also be challenged for their functional forms. Gupta employed a supply function and hence ignored the importance of demand factors. He alternatively estimated the supply function using simultaneous equation method which gave very similar results. But as was pointed out earlier, simultaneous equation methods yield consistent estimates but they could still be biased. Bautista's basic export function ignored all non-exchange rate variables on the assumption that the omitted variables determine only the long-term trend of export growth and decided to represent them by a single time trend variable.

Table 9.17 compares the exchange rate and exchange risk elasticities for India's exports from our study with those implied from the two studies discussed above. It can be seen that Gupta's work implied a very low negative risk elasticity (-.02 to -.03) which probably could be attributed to the fact we noted earlier, i.e., during the bulk of the sample period exchange risk remained nearly constant. Bautista's study distinguished between aggregate and manufactured product exports but unfortunately the risk elasticities though negative were only marginally significant in both equations. The value of the risk elasticities are, however, larger than that in Gupta's study, i.e., -.066 for aggregate exports and slightly higher -.074 for manufactured exports.[22] It is, however, important to note that these elasticities are short-run estimates.

Table 9.17 Exchange Rate and Exchange Risk Elasticities for India's Exports: Comparison with Previous Studies

Author	Sample period	Type of Export Flows	Exchange Rate Elasticity[a]	Exchange Risk Elasticity		
				Volume	Price	Value
Gupta[b] (1980)	1960-78 (quarterly)	Aggregate	-.027 - -.031[c]	-.020 -.033	-	-
Bautista (1981)	1974-79 (quarterly)	Aggregate	-1.288 (-2.074)[d]	-	-	-.066 (-.106)[d]
		Manufactured products	-1.696	-	-	-.074
Present study	1968-86 (annual)	Manufactured products	-1.339[e]- - 1.405	-.302	+.054	-.248
		Non-fuel Primary Products	-.631[e] - -.947	-	-.367	-.367

a. Exchange rate is defined in terms of foreign currencies per unit of domestic currency.

b. For this study, exchange risk is not specified in logarithms in export equations and elasticity estimates are computed from mean value of exchange risk.

c. Gupta's export function is specified as a supply function where export price and domestic price enter as separate variables. These values are the negative of export price elasticities (domestic price elasticities are insignificant) in the two alternative equations estimated.

d. Long run estimates

e. Values of two alternative specifications. The risk elasticities are almost equal in the two specifications and, therefore, only one value is given in this case.

Bautista employed the partial adjustment model. At the estimation stage he observed high collinearity between time trend and the lagged dependent variable and, therefore, omitted the former from the aggregate export equation and the latter from the manufacturing export equation. The long run exchange risk elasticity worked out at -.106 for aggregate exports.

Our study distinguished between manufactured and non-fuel primary product exports and estimated both volume and price elasticities. For manufactured exports, we found a highly significant negative volume elasticity of exchange risk and a positive price elasticity which when added together yielded a value elasticity of -.248, much higher than that estimated before. There has been no previous estimate of risk elasticity for export price for India. With regard to primary product exports of India, there has been no previous estimate of risk elasticity, either of volume or of price. We found that India's volume of primary product exports are unaffected by exchange risk but there is a very large negative risk elasticity for primary product export price amounting to -.367.

It would appear that our estimates of risk elasticities are too high. It would be worth comparing our estimates with those from some important studies in developed countries. Cushman (1988) estimated an average volume elasticity of -.03 for U.S. exports to, and -.09 for U.S. imports from, six industrial countries. An earlier work by Akhtar and Hilton (1984) computed volume risk elasticity of -.05 for U.S. exports to, and -.06 for U.S. imports from Germany. Kenen and Rodrik's (1984) study implied, surprisingly, a large positive risk elasticity of .19 for U.S. exports to ten industrial countries. In sharp contrast, the import elasticity of exchange risk for the U.S. worked out to -.21 according to a more recent study by Kenen and Rodrik (1986). This is so far the largest negative risk elasticity reported for developed countries. We have explained in earlier chapters (Chapters 6 and 8) in great detail why the exchange risk effect should be larger in developing countries than in developed countries. Our results, therefore, are realistic when compared to the Kenen-Rodrik 1986 study.

Compared to earlier studies on the impact of exchange risk on India's exports, our study represents a major advance. It uses alternative measures of exchange risk with emphasis on real effective variation. It takes into account all major demand and supply variables in the export function. There is separate estimates for price and quantity effects. Disaggregation of India's exports into manufacturing and primary products is undertaken which gave highly meaningful results. The role of currency invoicing is brought in to explain the price effects of exchange risk. Finally, the cost of exchange risk on India's exports is computed with the help of alternative elasticity measures.

9.7 Summary and Conclusion

We examined in this chapter the impact of exchange rate and exchange risk on India's exports with the help of separate volume and price equations derived from a fully specified supply-demand model in the tradition of Hooper and Kohlhagen but incorporating the special features of the Indian economy. One advantage of such a formulation is that we could do away with the extreme assumption of either an infinitely elastic demand or perfectly elastic supply curve as is usually done in empirical studies. Such an approach could enable, apart from estimating straightaway the impact of exchange rate change on price and quantity of exports, to assess the nature of the export market, i.e., to determine the power of exporters over export price. We used this general model in estimating the volume and price for aggregate exports on the one hand, and separately for manufactured and primary product exports, on the other.

The results of the aggregate equations gave a slightly higher than unit elasticity for export volume with respect to real effective exchange rate and indicated that Indian exporters have a large influence on export price although that influence is not absolute as foreign price also, to some extent, affects export price. Regarding the exchange risk, there is evidence that the volume of exports is adversely affected by it but there is a time lag in the operation of that impact which implies a lagged supply response. In contrast, the impact of exchange risk on export price is felt within the same year which is negative implying a larger demand than supply effect. We explained the negative price effect of exchange risk in terms of currency-invoicing of India's exports which are predominantly in those currencies which expose the buyers of India's goods to exchange risk much more than the sellers. We saw that aggregate volume results are vitiated by multicollinearity which is suspected as responsible for giving a negative world income elasticity for India's export volume. However, it is believed that the exchange rate and exchange risk elasticities are unaffected by multicollinearity as they remain more or less the same throughout the different stages of the estimation procedure.

Manufacturing export volume equation results indicated a real exchange rate elasticity larger than unity and also a virtually complete power in the determination of export price by the Indian exporters. The latter we felt to be somewhat exaggerated. With the help of a domestic manufacturing price equation we estimated a significant role for import price in the determination of India's domestic manufacturing price which implied a role for foreign price in the determination of export price operating via Indian domestic price. This dilutes somewhat India's influence on her manufacturing export price. Still, it is not very unrealistic to state that India's manufacturing exports are largely differentiated products and exporters do really wield a large power over the price.

Like in the case of aggregate exports, manufacturing export volume results also indicated a lagged negative response to exchange risk. However, for manufacturing export price, although it did have a negative exchange risk effect in the initial year, that was more than offset by a positive effect due to supply response in the second year. The negative first-year impact of exchange risk on India's manufacturing export price is supported by the pattern of denomination of India's export contracts which are tilted against importers of Indian goods as regards the exposure to exchange risk. The positive effect of exchange risk on manufacturing export price in the second year, on the other hand, once again indicates the ability of Indian exporters of manufactured products in influencing prices.

Primary product export equations threw up more interesting results. Export volume results indicated low responsiveness of the primary product sector with a real exchange rate elasticity of less than unity. But, more importantly, a 'stock-holding' effect was detected in this sector. That is, we noted a slightly larger quantity response from primary exports in the first year than from manufactured exports which was, however, offset to a certain extent in the next year by a negative response implying the exhaustion of inventories and the slow production response. Consistent with this type of behaviour in quantity, we uncovered a slow but large long-run price effect with respect to an exchange rate change. Nevertheless, we noted a significant effect of domestic price on export price of primary products which implies that India is not a price-taker even for her primary product exports. This is also confirmed by a very strong negative elasticity coefficient of capital stock in the primary product export price equation. This latter result has far-reaching implications for the continued specialization by India in a number of primary commodity products.

We did not find any significant exchange risk effect on the volume of primary product exports but found a strong negative risk effect on their price. This is plausible in the context of price-inelastic supply in this sector as demonstrated by Hooper and Kohlhagan (1978). The negative exchange risk effect on export price of India's primary commodity exports, like that for the manufacturing product exports, is substantiated by the invoicing pattern of India's exports which are weighted against importers of India's products. However, in the case of manufactured products, the negative effect on export price was a short-run impact and in the long run India's exporters could raise prices to compensate for the exchange risk. There is no evidence of that sort of effect for the primary products and, in contrast, they have a short run negative price effect of exchange risk which becomes even larger in the long run. This is consistent with the absence of any volume effect of exchange risk in this sector, coupled with the large demand effect of exchange risk.

It is for the first time that the estimation of the impact of exchange risk on India's exports is conducted in a systematic fashion. The existing studies on India can be criticized on various grounds. We surveyed the important studies in the area which revealed an entirely unsatisfactory situation. They suffer from a number of problems connected with the proper specification of the export function and the exchange risk proxy and also the selection of the period of study. We believe that we have remedied to a great extent those defects and produced results which are on firmer foundations.

Last, the contrast in exchange risk effect as between manufactured and primary product exports noted in the Indian case has profound implications for other LDCs which specialize in primary product exports. In many cases the exporting countries do not enjoy any monopoly power in the determination of export price and trade contracts are invoiced generally in the U.S. dollar. A large number of these countries follow a fixed peg with the dollar which implies large instability of their domestic currencies vis-a-vis non-dollar currencies. Hence there is likely to be a strong significant negative effect of exchange risk on their export prices if exports are predominantly directed towards countries other than the U.S. This is an area where future work would be rewarding.

Footnotes: Chapter 9

1. Although exchange rate instability (volatility) and exchange rate risk (uncertainty) are conceptually different as explained in Chapter 6, they are used alternatively in this chapter to denote the latter. The basic difference between the two is that the exchange risk constitutes only that portion of exchange rate instability which is unanticipated.
2. This is based on World Bank data which the author has used for this study.
3. See the latest survey on trade studies by Goldstein and Khan (1985)
4. Here we rule out third-country competition and assume that India's exports compete with the final goods or inputs of the foreign country to which India exports. This assumption is also implied in Khan (1974)
5. A number of econometric studies on exchange risk have specified the exchange risk in trade equation in original form whereas the non-risk variables have been specified in logarithms. Apart from the fact that such a procedure would involve additional work in indirectly deriving the risk elasticities, there appears to be no theoretical justification for this asymmetric treatment of the risk variable in a trade equation. As far as our final results are concerned, we find that whereas it does not make much difference to the coefficients of non-risk variables whether the risk variable is included in original or log form, the risk elasticity estimates indirectly derived from the former procedure are invariably larger than those obtained from the latter procedure.
6. There has been a suggestion in the literature that world trade, instead of world income, would capture the impact of trade restrictions (Polak, 1953, p.47-51). We have not opted for this alternative on account of two reasons: (1) data is not available for the full sample period by the relevant country groupings for world trade as in world income, (2) it is also not possible to

get disaggregated world trade into manufacturing and non-fuel primary products for each country groupings we are interested in. (See under Section 9.4 for details of computing world income).

7. There has been a number of studies, governmental and non-governmental, which have examined the Indian export incentive system in detail. These include Bhagwati and Srinivasan (1975), Nayyar (1976), Joshi (1978), Alexander Committee (1978), Dagli Committee (1979), Bagchi (1981), Sen (1982), Wolf (1982), and Abid Hussain Committee (1984).

8. The manufacturing unit labour cost for India (ULC) is constructed from World Bank data (World Tables, 1987) which gives separately indices of manufacturing real wage per employee (W_r) and manufacturing real output per employee (O) and also data from IMF Yearbook of International Financial Statistics (1987) which gives consumer price index (CPI). The formula applied is

$$ULC = \frac{W_r \times CPI}{O}$$

9. There is a growing literature on the new econometric methodology. See the articles which appeared in Oxford Bulletin of Economics and Statistics Vol. 48, No. 3, 1986, particularly Hendry (1986). Also see Engle and Granger (1987).

10. About 19 per cent of India's global exports during 1979-81 was with the 'bilateral group' countries. See Chapter 7, Footnote 4, for the details of the bilateral group countries.

11. For more details of the construction of real exchange risk proxies refer to Section 7.3 in Chapter 7.

12. There has been quite a few writings linking multicollinearity with unexpected signs of explanatory variables, e.g., Leamer (1975), Visco (1978, 1988), and Oksanen (1987)

13. The share of agriculture in the supply of raw materials to Indian industry was as high as 63 per cent in 1951 which declined to 38 per cent in 1970. See Chatterji (1985), p. 38.

14. Family Income and Expenditure Survey, Indian Labour Statistics, 1977.

15. The agricultural production index is on base triennium ending 1969-70 obtained from Economic Survey, Government of India.

16. The import price index is on a calender year basis computed from World Bank World Tables 1987. The dollar based index has been converted into rupee basis by using the exchange rate conversion factor also given in World Bank data.

17. See the discussion of the structure of the model in Section 9.3 for an elaboration of this point.

18. This is an approximate calculation based on the following additional assumptions:

    (1) For that portion of India's sterling-denominated exports to non-U.K. countries, the risk is distributed equally between exporters and importers; and

    (2) For all exports designated in currencies other than the rupee, the dollar and sterling, the entire risk is borne by Indian exporters.

19. By all four alternative measures the average exchange risk was minimum in 1971. See Figs 9.1 and 9.2

20. These are the risk proxies which gave significent coefficients for export volume and price.

21. See Chapter 8 for more details of the exchange risk measures used by Gupta.

22. Note that the exchange risk measures employed by Gupta and Baustista are quite different, and hence the risk elasticities from these studies are not strictly comparable.

APPENDIX

Table A9.1 Results from Alternative Risk Measures - Volume of Aggregate Exports

(Sample Period: 1969-86)

	1	2	3	4
Constant	12.059	12.513	11.364	11.201
	(4.79)	(4.44)	(4.39)	(3.88)
REER	-1.209***	-1.284***	-1.113***	-1.183***
	(-5.03)	(-4.83)	(-4.39)	(-4.24)
WY	-1.090*	-1.076*	-1.072*	-.851
	(-2.17)	(-1.95)	(-2.06)	(-1.47)
KF	1.846***	1.863**	1.717**	1.496**
	(3.13)	(2.76)	(2.88)	(2.30)
HA	-.987*	-1.051*	-.835	-.765
	(-2.05)	(-1.84)	(-1.73)	(-1.40)
$REV1_{-1}$	-.143**			
	(-2.48)			
$REV2_{-1}$		-.127		
		(-1.77)		
$VREER1_{-1}$			-.141**	
			(-2.21)	
$VREER2_{-1}$				-.093
				(-1.27)
R^2	.956	.948	.953	.942
DW	1.622	1.580	1.657	1.642

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values.

APPENDIX

Table A9.2 Results from Alternative Risk Measures - Price of Aggregate Exports

(Sample Period: 1968-89)

	1	2	3	4
Constant	-.619	-.490	-1.034	-.871
	(-1.59)	(-1.03)	(-2.45)	(-1.76)
FP	.534***	.614***	.448**	.545***
	(4.04)	(3.88)	(2.95)	(3.06)
HP	1.016***	.979***	.937**	.878***
	(6.00)	(5.21)	(4.77)	(4.15)
KF	-.492**	-.572**	-.242	-.322
	(-2.37)	(-2.23)	(-1.09)	(-1.26)
REV1	-.151***			
	(-3.51)			
REV2		-.153**		
		(-2.68)		
VREER1			-.106**	
			(-2.24)	
VREER2				-.090
				(-1.54)
R^2	.997	.997	.996	.996
DW	2.220	2.259	1.958	1.850

*** Significant at one per cent level

** " five "

* " ten "

Note: Figures in parentheses are t-values

APPENDIX

Table A9.3 Results from Alternative Risk Measures - Volume of Manufacturing Product Exports (1)

(Sample Period: 1969-86)

	1	2	3	4
Constant	9.842	10.885	8.366	9.875
	(3.99)	(4.18)	(3.30)	(3.62)
REERM	-1.405***	-1.591***	-1.139***	-1.395***
	(-3.61)	(-3.83)	(-2.84)	(-3.24)
KFM	.321*	.266	.357*	.268
	(1.90)	(1.55)	(2.05)	(1.45)
$REV1_{-1}$	-.302**			
	(-2.54)			
$REV2_{-1}$		-.307**		
		(-2.34)		
$VREER_{-1}$			-.315**	
			(-2.42)	
$VREER2_{-1}$				-.236
				(-1.68)
R^2	.848	.840	.843	.815
DW	1.923	2.122	1.754	2.042

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values

APPENDIX

Table 9A.4 Results from Alternative Risk Measures - Volume of Manufacturing Product Exports (2)

(Sample Period: 1969-86)

	1	2	3	4
Constant	8.319	9.38	6.921	8.057
	(2.49)	(2.74)	(2.01)	(2.24)
REERM	-1.339***	-1.510***	-1.096**	-1.279**
	(-3.09)	(-3.35)	(-2.46)	(-2.75)
WY	.521*	.456	.559*	.488
	(1.82)	(1.58)	(1.89)	(1.58)
$REV1_{-1}$	.297**			
	(-2.48)			
$REV2_{-1}$		-.310**		
		(-2.38)		
$VREER1_{-1}$			-.299**	
			(-2.28)	
$VREER2_{-1}$				-.252* (-1.82)
R^2	.845	.841	.837	.819
DW	1.745	1.991	1.572	1.934

*** Significant at one per cent level;
** " five "
* " ten "

Note: Figures in parentheses are t-values

APPENDIX

Table A9.5 Results from Alternative Risk Measures - Price of Manufacturing Product Exports

(Sample Period: 1969-86)

	1	2	3	4
Constant	-4.134	-4.558	-4.238	-4.546
	(-6.10)	(-5.90)	(-5.78)	(-4.89)
HPM	1.214***	1.089***	1.200***	1.123***
	(7.60)	(5.52)	(7.85)	(5.31)
HA	.597*	.813**	.637*	.784*
	(2.04)	(2.32)	(2.12)	(1.94)
REV1	-.143*			
	(-1.77)			
$REV1_{-1}$	.197**			
	(2.62)			
REV_2		-.071		
		(-.73)		
$REV2_{-1}$		.212**		
		(2.30)		
VREER1			-.079	
			(-.89)	
$VREER1_{-1}$			.140	
			(1.60)	
VREER2				-.024
				(-.22)
$VREER2_{-1}$				.137
				(1.24)
R^2	.992	.990	.989	.988
DW	2.495	2.330	2.266	2.203

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values

APPENDIX

Table A9.6 Results from Alternative Risk Measures - Price of Primary Product Exports

(Sample Period: 1968-86)

	1	2	3	4
Constant	-.352	.516	-.655	.106
	(-.24)	(.33)	(-.42)	(.06)
FP	.546*	.749**	.479	.695*
	(1.96)	(2.54)	(1.57)	(2.15)
HPP	.980***	.838**	.895**	.707*
	(3.13)	(2.70)	(2.71)	(2.13)
KFP	-1.022***	-1.175***	-.788**	-.901**
	(-3.13)	(-3.05)	(-2.44)	(-2.34)
REV1	-.184**			
	(-2.55)			
REV2		-.188**		
		(-2.20)		
VREER1			-.146*	
			(-1.98)	
VREER2				-.109
				(-1.29)
$(XPP\text{-}HPP)_{-1}$	.498**	.392*	.475*	.387
	(2.37)	(1.82)	(2.11)	(1.62)
R^2	.990	.989	.988	.986
DW	1.969	1.686	1.813	1.577

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values

APPENDIX

Table A9.7 Results from Alternative Specifications of Aggregate Export Volume Equation

(Sample Period: 1969-86)

	1	2	3	4	5
Constant	12.059	6.124	4.856	9.174	7.173
	(4.79)	(2.85)	(2.41)	(3.94)	(5.60)
REER	-1.209***	-.918***	-.785**	-1.102***	-.874***
	(-5.03)	(-3.19)	(-2.80)	(-4.21)	(-4.18)
WY	-1.090*	.209	.677***	-.550	-
	(-2.17)	(.57)	(4.25)	(-1.15)	
KF	1.846***	-	-	.758***	.799*
	(3.13)			(2.68)	(2.10)
HA	-.987*	.378	-	-	-.437
	(-2.05)	(1.405)			(-.94)
$REV1_{-1}$	-.143**	-.082	-.101	-.097	-.128*
	(-2.48)	(-1.16)	(-1.42)	(-1.64)	(-1.97)
R^2	.956	.921	.909	.941	.939
SEE	.052	.068	.070	.058	.059
RSS	.0326	.0593	.0683	.0440	.045
DW	1.622	1.446	1.031	1.540	1.100

*** Significant at one per cent level
** " five "
* " ten "

Note: Figures in parentheses are t-values.

Chapter 10

Policy Implications

10.1 Introduction

We examined in previous chapters the evolution of the Indian exchange rate system and, in some detail, the mechanics and features of the present basket system. We also studied the impact of the basket peg on exchange rate stability. Finally, we estimated the impact of the exchange rate and exchange rate volatility on India's exports. In this chapter we attempt to examine the policy implications of our study on the Indian exchange rate system.

10.2 Macroeconomic Policy Implications

10.2.1 Objectives under the Basket System

We saw in Chapter 5 that the Indian authorities appeared to have directed the exchange rate policy since the basket peg towards alternative objectives other than the one which prompted the original move from a sterling peg to a basket peg, namely, the stability of the exchange rate. Among the different alternative objectives that might have influenced the Indian exchange rate management, three need close examination. They are (1) anti-speculation objective, (2) anti-inflation objective, and (3) the objective of shadowing the dollar. We analyse each of these below.

(1) Anti-speculation Objective:

The role of private speculation in free foreign exchange markets is in fact controversial: it could very well be stabilizing as it could be destabilizing.[1] However, in an administered exchange rate regime, the central bank determines the exchange rate and private speculation is unnecessary for the stabilization purpose. On the other hand, private speculation could be rather destabilizing in times of balance of payments crises by offering a one-way bet to the speculators. Moreover, in the context of an overall scarcity of foreign exchange, the authorities are naturally concerned that every foreign exchange transaction should correspond to a genuine commercial transaction.

In order to prevent speculation in Indian exchange market, the foreign exchange control regulation currently prescribes that the banks should keep square or near square positions in each foreign currency at the end of each day. This is, in fact, a relaxation made since 1978 prior to which banks were required to maintain square or near square positions in foreign currencies at all times (see Rangarajan, 1985, p. 1048). Therefore, foreign exchange dealers in India do have some limited leverage for speculative activities without violating the exchange control regulation. In that context, if exchange rate changes are made unpredictable by making the functional relationship between domestic and foreign currencies somewhat imprecise, foreign exchange dealers could further be dissuaded from indulging in speculation.

We noted in Chapter 5 that the very purpose of the confidentiality of the official currency basket has been to discourage speculation in foreign exchange markets and that the flexible operation of the wider margins in the system further promotes this objective.

(2) Anti-inflation Objective:

The employment of the exchange rate for anti-inflationary purposes usually means an exchange rate appreciation with a view to hold down price rise. (See Stevenson and Vines, 1989). We may, however, extend it also to a case where the authorities refuse to depreciate the exchange rate in the event of a clear balance of payments need for fear that such an action should undermine anti-inflationary considerations.

Fig. 10.1 gives the graph of the rupee's 11-country export-weighted nominal and real effective exchange rate for the period 1975 to 1984 and Fig. 10.2 that of India's current account balance as a per cent of GDP for the corresponding financial years.[2] As can be seen from Fig. 10.2, following the second oil shock in 1979-80, India's current account changed from a comfortable surplus to a considerable deficit. However, as can be noted from Fig. 10.1, the rupee's nominal effective exchange rate (NEER) appreciated slightly during 1979-82. With inflation faster in India than abroad during 1980 and 1981, that led to a substantial rise in the real effective exchange rate (REER). We feel that during a period when the REER should have been depreciated for correcting external imbalance, authorities did not do so lest it should worsen the inflationary situation. Instead, they pushed the NEER upwards somewhat.

We had occasion in Chapter 2 of referring to the experience of a number of LDCs erratically shifting their exchange rate regimes for the sake of relieving inflatioinary pressures. In Chapter 4 we noted that the abandoning of the sterling peg by India in favour of a basket peg in 1975 could partly be

FIG. 10.1 EXPORT–WEIGHTED NOMINAL AND
REAL EFFECTIVE EXCHANGE RATE, 1975–84

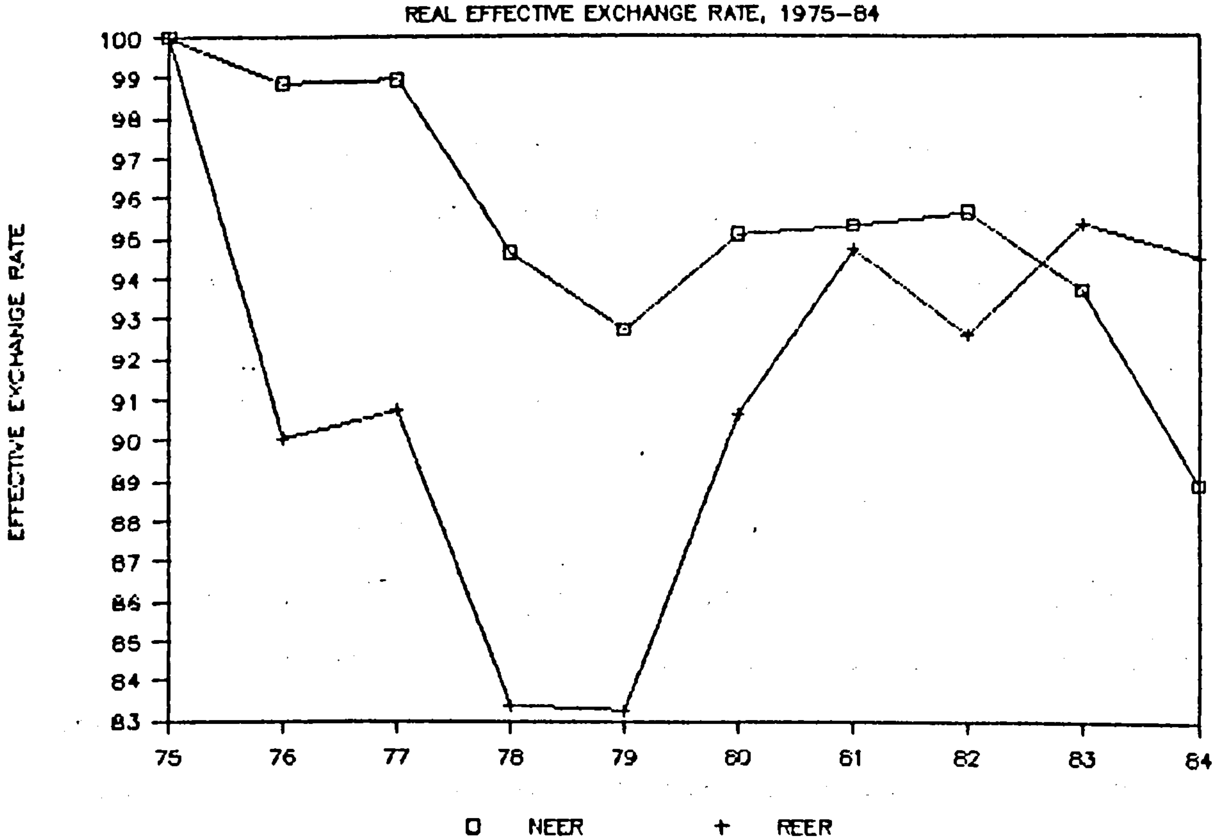
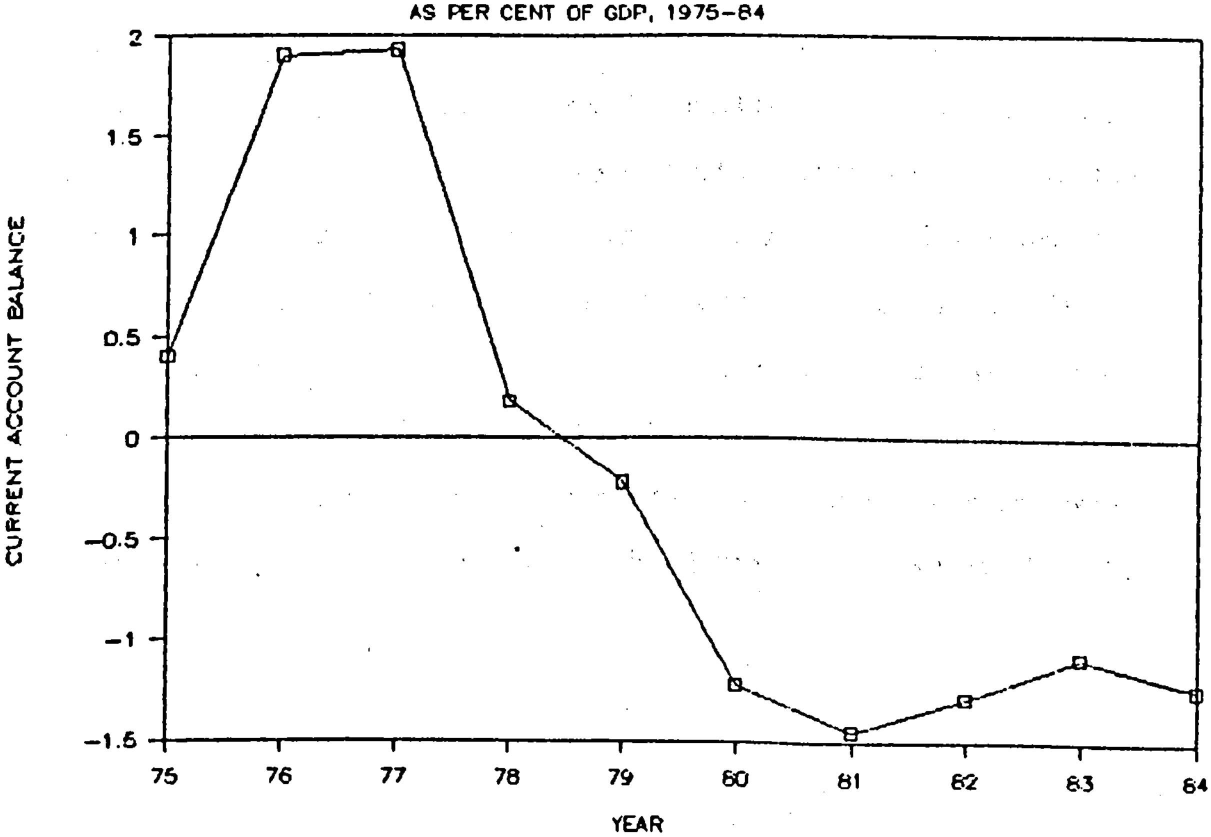


FIG. 10.2 CURRENT ACCOUNT BALANCE
AS PER CENT OF GDP, 1975–84



triggered off by anti-inflationary considerations. India, however, did not change the exchange rate regime afterwards although the authorities altered the style of administering it since 1978. The entry of anti-inflation motive in exchange rate management could explain partly the change in the *modus operandi* of the exchange rate regime.

(3) Shadowing the Dollar:

Yet another aspect of India's exchange rate management appears to be the shadowing of the U.S. dollar by the rupee. Fig. 10.3 gives separately the instability of eleven major nominal rupee rates including the rupee-dollar rate averaged through export weights (effective variation), as well as the instability of the rupee-dollar rate during 1968-87. The measure of instability is the standard deviation of percentage changes in exchange rates calculated each month on a moving basis for the previous 12-month observations and averaged for each year (see Chapter 7 for details of construction methodology). Fig. 10.4 shows the similar picture in real terms. The most striking point that emerges from these graphs, particularly Fig. 10.3, is that, whereas the rupee's variability vis-a-vis the dollar had been larger than its average variability against the eleven currencies (effective variation) during the sterling peg, 1972-75, the position got reversed ever since the adoption of the basket peg. More importantly, during the famous period of "dollar overvaluation" of 1980-84, the instability of the rupee-dollar rate declined steadily and substantially relative to rupee's average instability vis-a-vis all the eleven currencies (including the dollar).

FIG.10.3 EXPORT–WEIGHTED NOMINAL EFFECT.

VARN. & VARN. AGAINST DOLLAR, 68–87

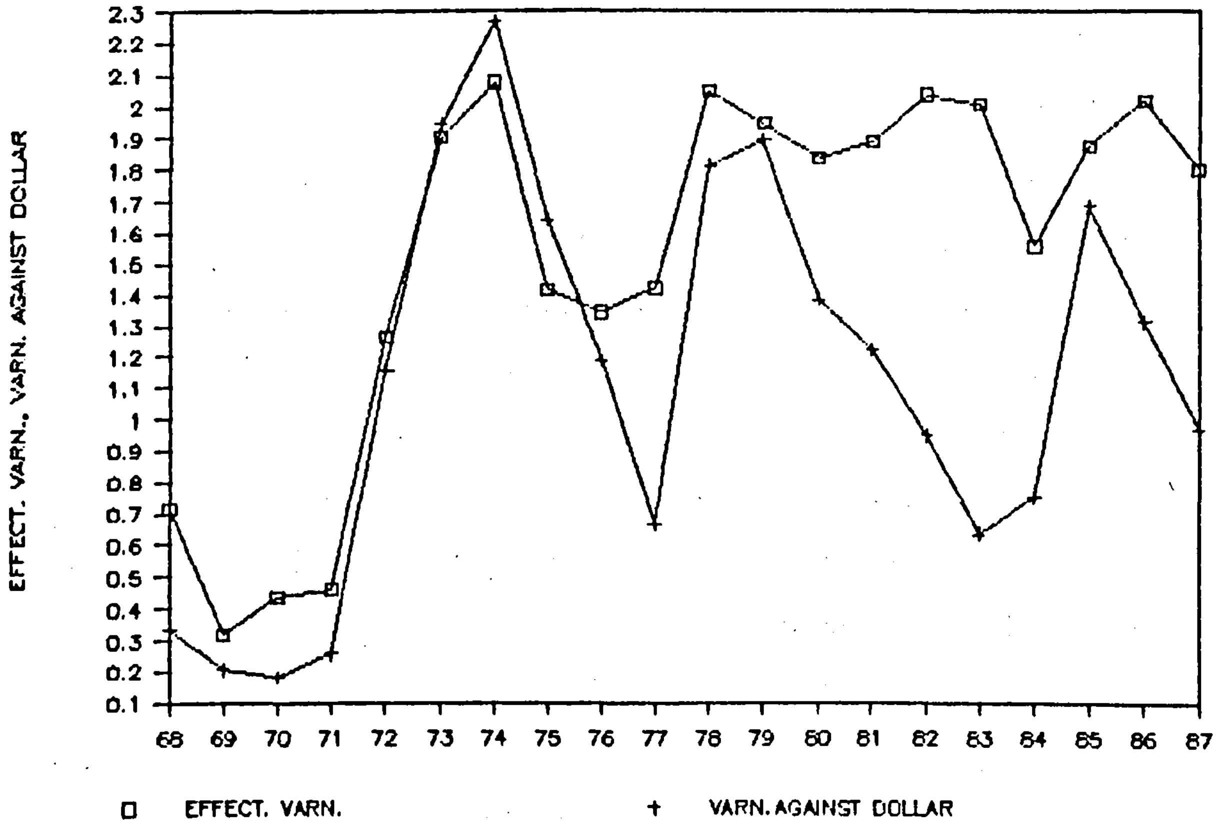
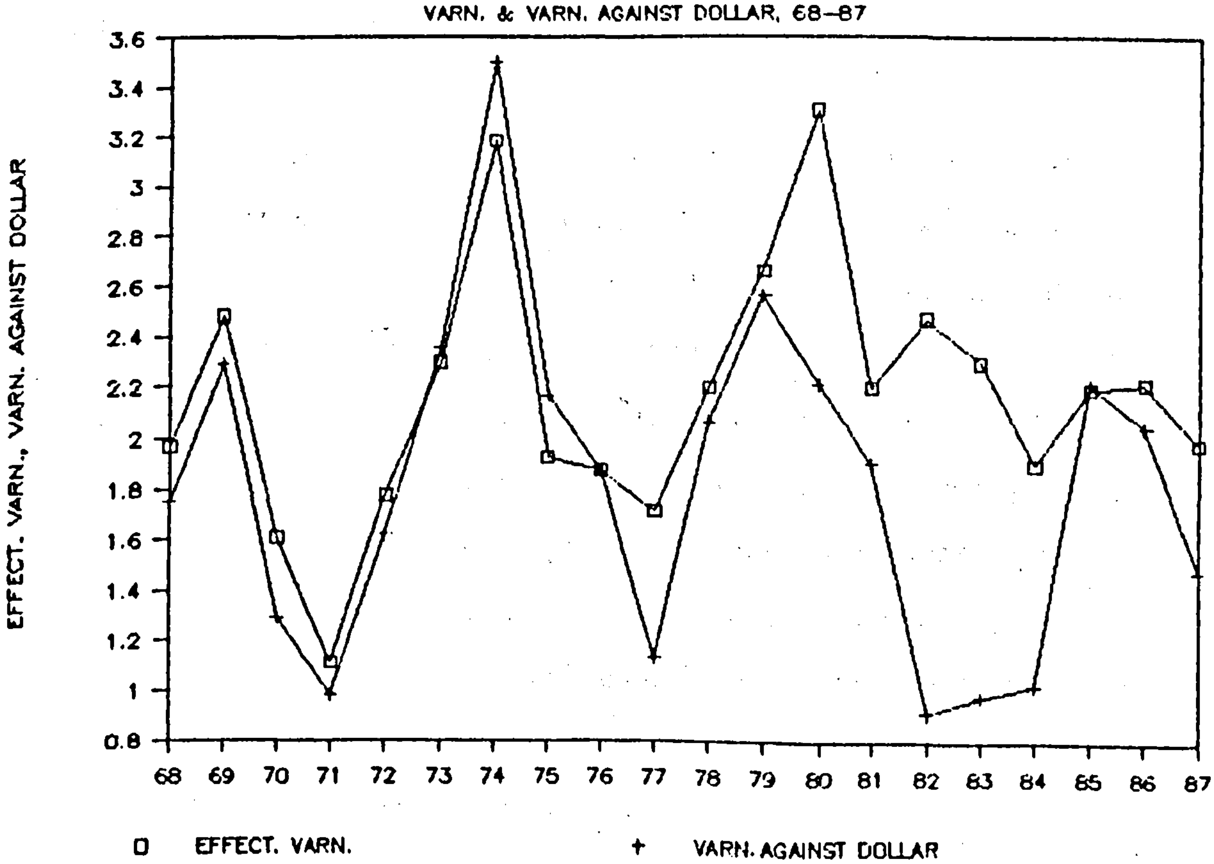


FIG.10.4 EXPORT–WEIGHTED REAL EFFECT.

VARN. & VARN. AGAINST DOLLAR, 68–87



We have already noted in earlier chapters that the dollar accounts for the invoicing of a substantial portion of India's merchandise (on the average, 44 per cent of India's merchandise exports and 64 per cent of merchandise imports during 1979-80 to 1981-82) and that this invoicing share is considerably larger than the share of the U.S. in India's trade (an equal 13 per cent of India's merchandise exports and imports during 1979-80 to 1981-82). Though estimates are not available, it is expected that the dollar occupies a key position with regard to the denomination of India's invisibles trade including private remittances as also with regard to her capital transactions. Hence the authorities concern for the stability of the rupee-dollar rate.

10.2.2. Analysis of the Objectives

Two questions arise from the above discussion. First, are the above-mentioned objectives desirable in themselves? Second, if they are desirable, is exchange rate policy the best way to achieve them?

We saw that the elimination of private speculation is desirable in the Indian context as it does not serve the stabilization function as in a floating exchange rate system but instead, it could very well be destabilizing. Nevertheless, we may state that if speculation is undesirable, the creation of exchange risk by making exchange rates unpredictable, is still more undesirable given the evidence of the high cost of such a policy on the economy. Our econometric study provides evidence of a strong depressing effect of exchange risk on India's exports. We may therefore suggest that a better way to tackle speculation in Indian foreign exchange markets is through a more strict administration of the existing exchange control regulations, rather than through the exchange rate policy.

As regards the anti-inflation objective, there is no doubt that every government should pursue it. But the rise of the exchange rate for holding down inflation could have sometimes disastrous consequences on the country's balance of payments. Let us revert to the instance when the authorities appeared to have aimed to bring down the rate of inflation through exchange rate management. During 1979-82, the Indian authorities maintained a roughly stable or slightly rising trend in nominal effective exchange rate. During 1979-81 the Indian inflatiion was high due partly to the oil shock of 1979 and partly also due to a major crop failure during the financial year, 1979-80. Is it not sensible to maintain a stable nominal exchange rate when there occurs a domestic supply shock? As we argued in Chapter 3, provided that the country had been planning to deflect the domestic supply shock through large food imports, the policy of maintaining a stable nominal effective exchange rate would have been justified. But it may be noted that India had a comfortable buffer stock of foodgrains when the harvest failure occurred in 1979 and also that the net imports of foodgrains during all the three years 1978 to 1980 by the country had in fact been negative! (See Government of India Economic Survey 1988-89, p. S24). Under these circumstances, keeping the nominal effective exchange rate steady was not necessary. On the other hand, the permanent terms of trade shock arising from the more than doubling of world oil prices would have required a depreciation of the real, not just the nominal, effective exchange rate for boosting non-agricultural exports. Moreover, in the event of a more rapid inflation at home than abroad, a stable or nearly stable nominal exchange rate meant an unstable real exchange rate further depressing exports.

Now let us examine the desirability of keeping a stable rupee-dollar rate which appears to be yet another important consideration in India's exchange rate management. The major argument for following the dollar stems from the predominance of that currency in the invoicing of India's foreign transactions. Currency invoicing no doubt influences the very short-run effects of exchange rate fluctuations on the domestic currency value of payments and receipts. However, what is much more important for trade in goods and services is the competitive position of the home country vis-a-vis its trading partners. The weight for relative competitiveness in turn is to be on the basis of the trade share of countries and not the currency share of trade invoicing. As regards the private remittances which constitute a major item under India's invisibles account, they are anyway largely independent of exchange rate movements. A large part of India's capital transactions is also exogenous. The recent importance of commercial borrowing which are perhaps mostly denominated in dollar is also not a sufficient reason for keeping the dollar-rupee rate relatively more stable.

In the context of India's geographically diversified international transactions, the stability of the rupee-dollar rate alone while not having any special significance, could very well be harmful to India's exports. Exports are determined by both demand and supply factors. With a stable dollar-rupee rate, it is true that the short-run currency risk is eliminated for India's exporters whose contracts are invoiced in dollars, but is not eliminated for the demanders of India's exports whose currencies are fluctuating against the dollar. That would depress the foreign demand for India's products resulting in a cut in price. Our empirical study in the last chapter showed that for manufactured exports such negative price effect is evident in the short run, and is quite high in the case of India's primary commodity exports, both in the short and long run.

To sum up the discussion so far: exchange rate policy in the past has been directed towards alternative objectives such as the minimization of speculation and the rate of inflation, and the stabilization of the rupee-dollar rate. This came in conflict with exchange rate stability in real terms which in turn adversely affected India's exports.

10.2.2 Implications for India's Current Account

Now let us see the implications of our analysis for the emerging current account situation in the country. In perspective, the country had been having persistent balance of payments problem ever since the mid-fifties, except for a brief period of 1975-79. The government has initiated a gradual trade liberalization programme[3] since 1985. Trade liberalization, although likely to improve the current account in the long run, could worsen it in the short and the medium term. (See Ray, 1987; and Mussa, 1987). In order to project India's current account for the next five years, 1989-90 to 1983-84, we use the results of our export equations in Chapter 9 as well as the following assumptions:

(i) the trend in rupee's annual real effective exchange rate would remain at the existing level with the real exchange rate instability also remaining at the existing average level;

(ii) world real income would grow at 3 per cent per annum;[4]

(iii) India's GNP/GDP/domestic absorption would grow in real terms by 6 per cent per annum;[5]

(iv) domestic price/GDP deflator would rise by 5 per cent per annum in the absence of any exchange rate adjustment;[6]

(v) inflation in the economies of India's trading partners/competitors would be at the rate of 3 per cent per annum;[7]

(vi) the rupee value of India's imports would grow in such a way as to raise its share in nominal GDP steadily from 8 per cent in 1989-90 to 8.4 per cent in 1993-94; there is no impact on imports from changes in exchange rate and exchange rate instability;

(vii) exports would get an additional boost due to liberalization to the extent of 2 per cent in 1989-90 which will gradually rise every year to reach 4 per cent in 1993-94; and

(viii) the net inflow of invisibles in rupee terms would remain at the estimated 1988-89 level of Rs. 3600 crores[8] in each of the five successive years.

The details of computation are shown in Appendix Table A10.1. The summary of the results are given in Table 10.1 below.

Table 10.1 Projection of Exports and Current Account Balance (CAB) with Constant REER and Existing Average Level of Real Exchange Rate Instability, 1989-94 (Per Cent of GDP)

Year	Exports	CAB
1988-89	5.5	- 1.95
1989-90	5.4	- 1.73
1990-91	5.4	- 1.90
1991-92	5.4	- 2.05
1992-93	5.5	- 2.16
1993-94	5.6	- 2.24

Table 10.1 indicates that given the existing level of the REER and real exchange rate instability and under other assumptions listed earlier, the share of exports would remain nearly constant at 5.5 per cent of the GDP and the current account deficit would further deteriorate, from nearly 2 per cent of the GDP in 1988-89 to 2.2 per cent in 1993-94. Such a current account outcome may not be sustainable for the country with an already precarious external debt situation.[9]

A further simulation with our export equation estimates shows that a depreciation of the rupee's REER by 8 per cent per annum could turn the huge current account deficit gradually into a comfortable surplus in the terminal year, as illustrated in Table 10.2 on next page. (See Appendix Table A10.1 for details).

Table 10.2 Projection of Exports and Current Account Balance (CAB) with Depreciation of REER at 8 Per Cent per Annum and Existing Average Level of Real Exchange Rate Instability, 1989-94 (Per Cent of GDP)

Year	Exports	CAB
1988-89	5.5	- 1.95
1989-90	6.1	- 0.99
1990-91	6.7	- 0.50
1991-92	7.5	+ 0.14
1992-93	8.4	+ 0.91
1993-94	9.4	+ 1.83

Thus Table 10.2 indicates that the share of India's exports would rise sharply from 5.5 per cent in 1988-89 to 9.4 in 1993-94 and the current account would be converted from a deficit of 2 per cent of GDP to a reasonably high surplus of 1.8 per cent over the same period, if the REER were to depreciate at 8 per cent per annum with no change in real exchange rate instability over the past average level.[10]

In the above two scenarios of India's current account, we assumed the existence of real exchange rate instability at the previous average level. Now let us see what would a reduction in real exchange rate instability imply. Recall from Chapter 9 one of the concepts of average cost of exchange risk, namely, the increase in exports that would have resulted if the exchange risk were the minimum that was achieved during the period of study, i.e. 1968-86. Applying that definition we have worked out to see what would be the implication for

India's exports and current account balance during the next five years if exchange rate instability in real terms were brought down to the minimum that is feasible.[11] The results are summarized in Table 10.3 (see Appendix A10.1 for details).

Table 10.3 Projection of Exports and Current Account Balance (CAB) with Constant REER and Real Exchange Rate Instability Reduced to the Past Average Minimum, 1989-94 (Per Cent of GDP)

Year	Exports	CAB
1988-89	5.5	- 1.95
1989-90	5.8	- 1.35
1990-91	6.6	- 0.79
1991-92	7.4	- 0.10
1992-93	8.4	+ 0.75
1993-94	9.6	+ 1.78

Table 10.3 shows that by retaining the REER at the existing level but by lowering real exchange rate instability to the minimum of the previous period, i.e. by about 50 per cent of the existing average level, India's exports would grow sharply from 5.5 per cent of GDP in 1988-89 to 9.6 per cent of GDP in 1993-94 and the current account improve from a deficit of about 2.0 per cent of GDP to a comfortable surplus of 1.8 per cent during the same period.[12] This, by strange coincidence, is almost what it would be if the REER were brought down by 8 per cent per annum over the period with the retention of exchange rate instability at the past average level.

A point of clarification needs to be made here. The system of basket peg serves in stabilizing the effective exchange rate which is consistent with instability in all bilateral rates. In the context of India's exports, as explained in the last chapter, the proper concept of exchange rate instability is the average variability of bilateral rates (effective variation) rather than the variability of effective exchange rate. But we have also noted the close positive correlation between the two measures in India meaning that, a reduction in variability of the effective exchange rate would lead to a reduction in the average variability of bilateral rates as well.

To sum up: the exercise above brings out clearly the crucial importance that has to be attached to a policy of minimization of real exchange rate instability in the context of India in order to improve the export performance and the current account situation in the country. The pursuance of extraneous goals at the expense of exchange rate stability has been highly costly for the country's exports in particular and balance of payments in general.

10.3 Microeconomic Policy Implications

The argument for exchange rate stability as developed above is also an argument for the desirability of a basket peg for India. The basket system is well suited for the purpose of minimization of exchange rate instability. An alternative to basket peg is independent floating which would imply the opening up of the capital account of the balance of payments as we saw in Chapter 3. But there is now theoretical and empirical evidence to show that liberation of the capital flows during a process of liberation of the trade flows would be destabilizing (see e.g., McKinnon, 1982; Edwards, 1984 and 1987; and Bruno, 1985).

In the context of India with chronic current account deficits, freeing of capital controls would encourage destabilizing capital outflows. In order to prevent massive outflow of capital, the domstic interest rates may have to be raised so high that it would induce domestic recession and jeopardize growth in the exportable sector. Issues arise here concerning the reform of the domestic financial markets through freeing the administered interest rates and the lowering of levels of fiscal deficit as a prerequisite for such a reform (see McKinnon and Mathieson, 1981; and McKinnon, 1981). A full discussion of these issues is not pertinent here. The main point is that in the medium term, with a gradual trade liberalization process that is being undertaken within the country, a multi-currency peg seems to be the optimal exchange rate regime to serve the interest of both internal and external balance.

Although a basket peg is suited to Indian conditions, our analysis does not indicate that the present basket peg is the optimum one. Our arguments on this aspect of India's exchange rate regime is based on (a) the role of sterling in the basket system and (b) the composition of the currency basket. These are explained below.

10.3.1. The Role of Sterling in the Basket System

Our detailed study of the evolution of the Indian exchange rate system in Chapter 4 revealed that the present importance of sterling in India's exchange rate system is explaineld by historical and political reasons and cannot be explained fully on pure economic grounds such as the role of sterling in India's external transactions. Sterling is the intervention, valuation and designation currency of the Indian exchange rate system.

We noted a partial dilution of the role of sterling as intervention currency since February 1987 as the Reserve Bank started selling of the U.S. dollar in addition to sterling. This reform would reduce the additional transaction costs on the part of banks in first buying the pound from the Bank and later converting them into dollars to meet the dollar requirements. This in turn would result in better exchange rate quotations for the bulk of customer transactions.

With regard to the role of sterling as the valuation currency, i.e. the numeraire in the basket system, the point raised by Varghese (1979) is quite valid. That is, sterling rates of currencies in international markets are indirect rates derived from dollar quotations, and therefore, contain distortions due to conversion costs. Hence the dollar is more appropriate than sterling as the unit of account for the Indian basket system.

Once the dollar becomes the major intervention currency and also the unit of account in the basket system, then by logic it should also be the designation currency, i.e., the medium through which exchange rate adjustments are announced by the Bank. The only objection one could envisage in not making the dollar the designation currency is that, in the basket-managed system, the domestic currency value of the designation currency undergoes frequent changes in order to maintain stability of the domestic currency with the basket. In other words, in such a system, targeting of the dollar-rupee rate would be very difficult. But as we argued earlier, the policy of targeting dollar-rupee rate at the expense of other rupee rates does not appear desirable in the context of India's geographically well diversified external transactions.

10.3.2 The Composition of India's Currency Basket

The confidentiality of India's official currency basket precludes a conclusive statement on the optimality of the present Indian basket system. However, it may be stated that a narrow basket with just four currencies, if that is what the present system consists of, cannot constitute an optimum currency basket for the country. This could be illustrated through a comparison of the movements of different indices of rupee's nominal and real effective exchange rates as well as their variability based on alternative assumptions of what constitutes an optimal basket.

We have three indices on rupee's effective exchange rate which were constructed and employed in previous chapters. They are, (1) 4-country trade-weighted index with weights based on 1972-74 trade share; (2) 11-country modified trade-weighted index with weights based on modified trade shares during 1979-81; and (3) 11-country export-weighted index with weights based on export shares during 1979-81. Fig. 10.5 plots the corresponding nominal

FIG.10.5 ALTERNATIVE INDICES OF NOMINAL
EFFECTIVE EXCHANGE RATE OF RUPEE, 74–88

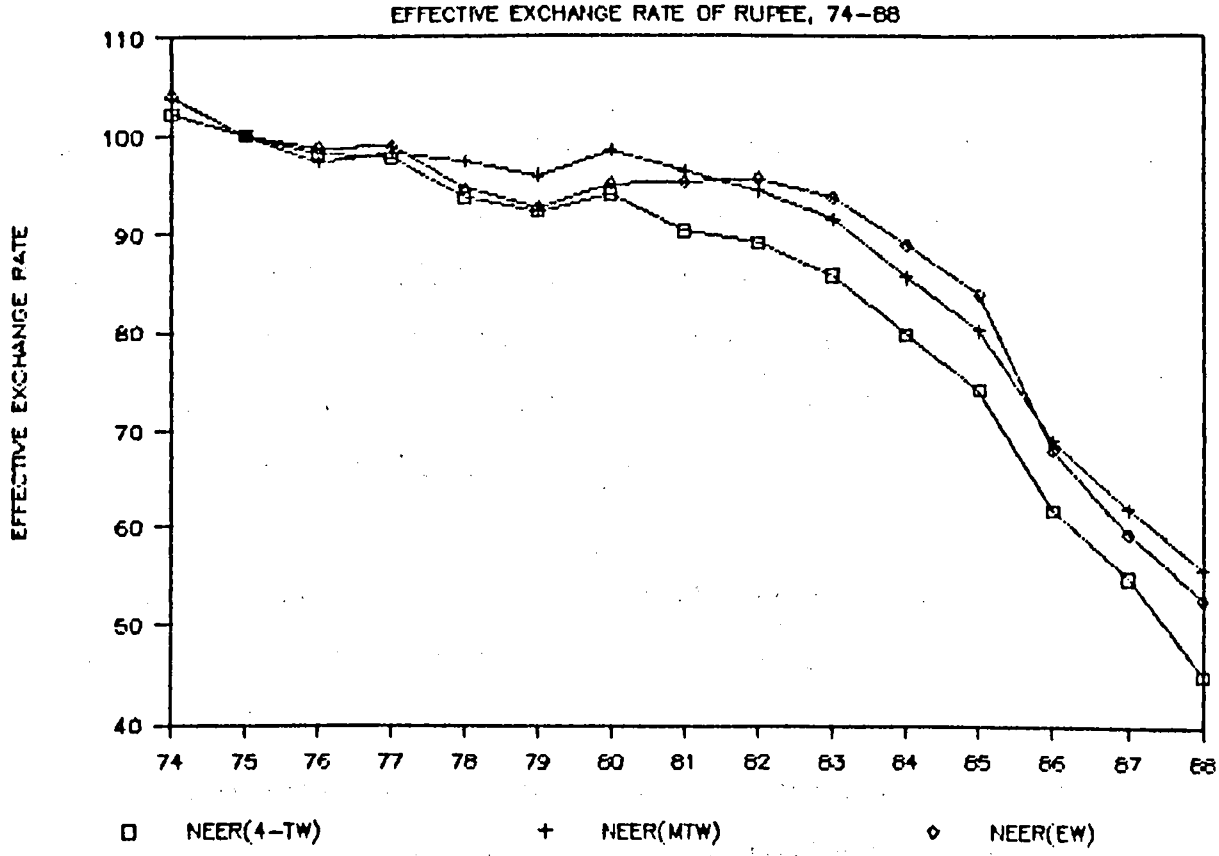
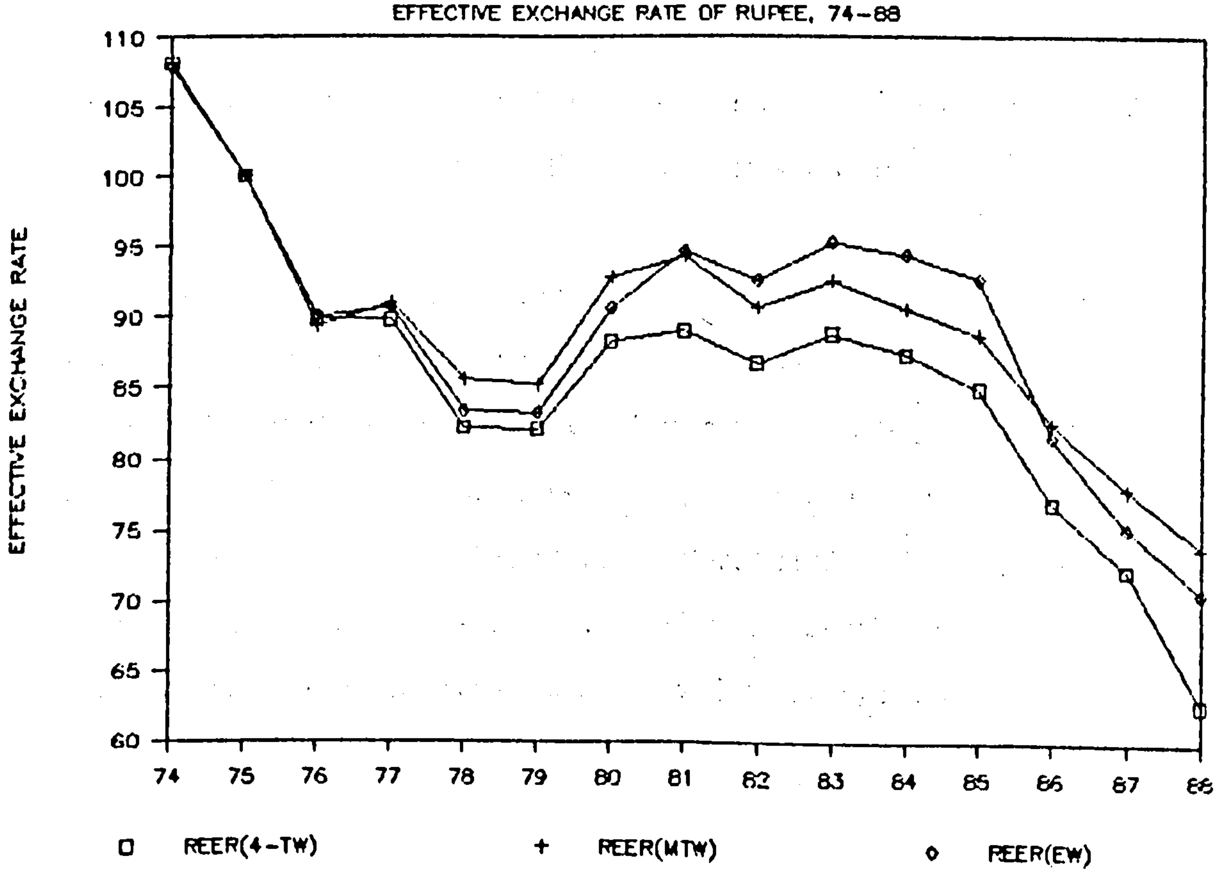


FIG.10.6 ALTERNATIVE INDICES OF REAL
EFFECTIVE EXCHANGE RATE OF RUPEE, 74–88



effective exchange rate indices: NEER (4-TW), NEER (MTW), and NEER (EW), for the period 1974-88. Fig. 10.6 gives the graph of the respective real effective exchange rate indices: REER (4-TW), REER (MTW) and REER (EW), also for 1974-88. These graphs indicate that although the three nominal and real exchange rate indices generally move in the same direction, the extent of their movements varied considerably since 1978.

Turning to alternative measures of instability of effective exchange rate indices, we employ the measures based on moving standard deviation of percentage changes of the above-mentioned effective exchange rate indices. Fig. 10.7 gives the annual trends in variability of nominal effective exchange rates based on 4-country trade-weighted index, VN (4-TW); 11-country modified trade weighted index, VN (MTW); and 11-country export-weighted index, VN (EW), all for the period 1974-87. Fig. 10.8 plots the corresponding instability measures in real terms, VR (4-TW); VR (MTW); and VR (EW). These graphs indicate large divergence among alternative nominal instability measures since 1980 and among alternative real instlability measures since 1979.

The analysis above illustrates the importance of getting the proper currency basket right for India. One should ideally have in the Indian currency basket also currencies of developing countries (e.g., Brazil, China, Hongkong, Malaysia, Philippines, Singapore and Taiwan) which are increasingly competing with India's manufactured products in third markets. But the weights of these currencies in the basket should not be based merely on the shares of these countries in India's trade, which anyway are not much, but

FIG.10.7 MEASURES OF VARIATION OF NOMINAL EFFECTIVE EXCHANGE RATE, 74-87

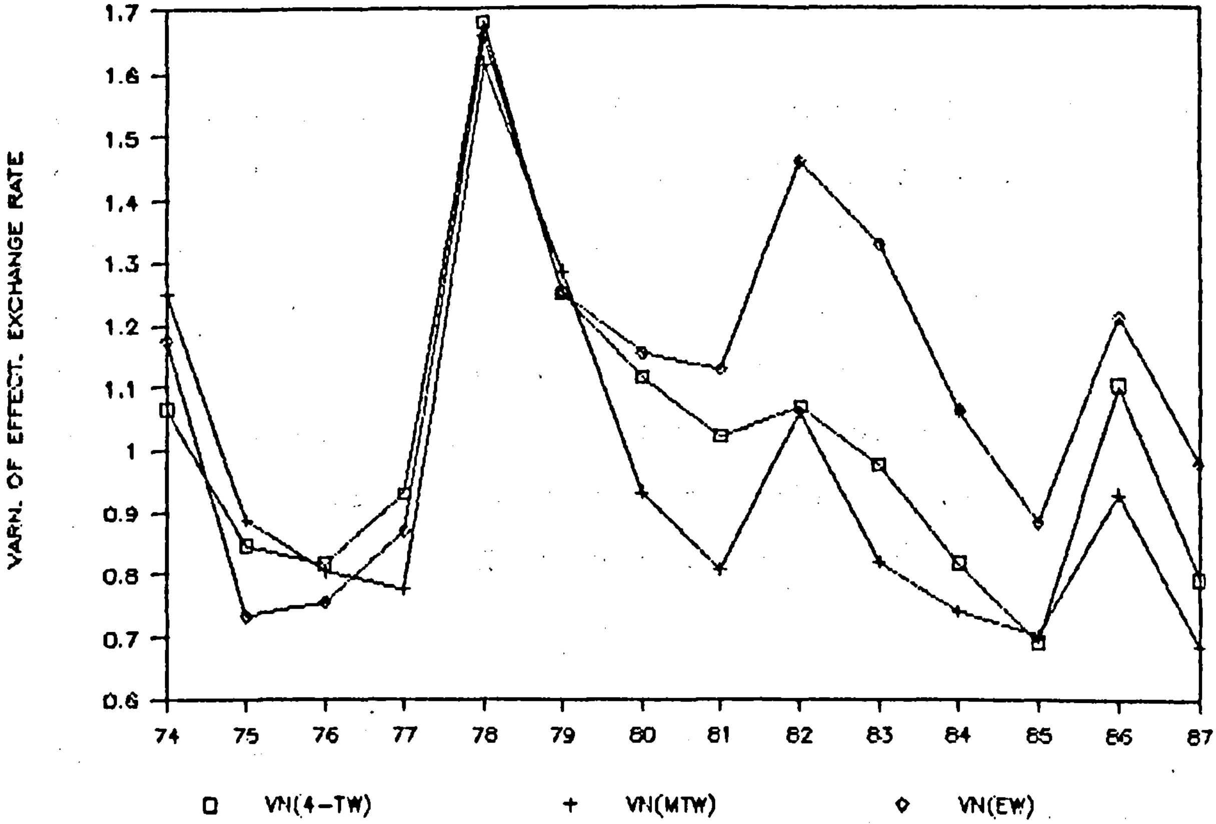
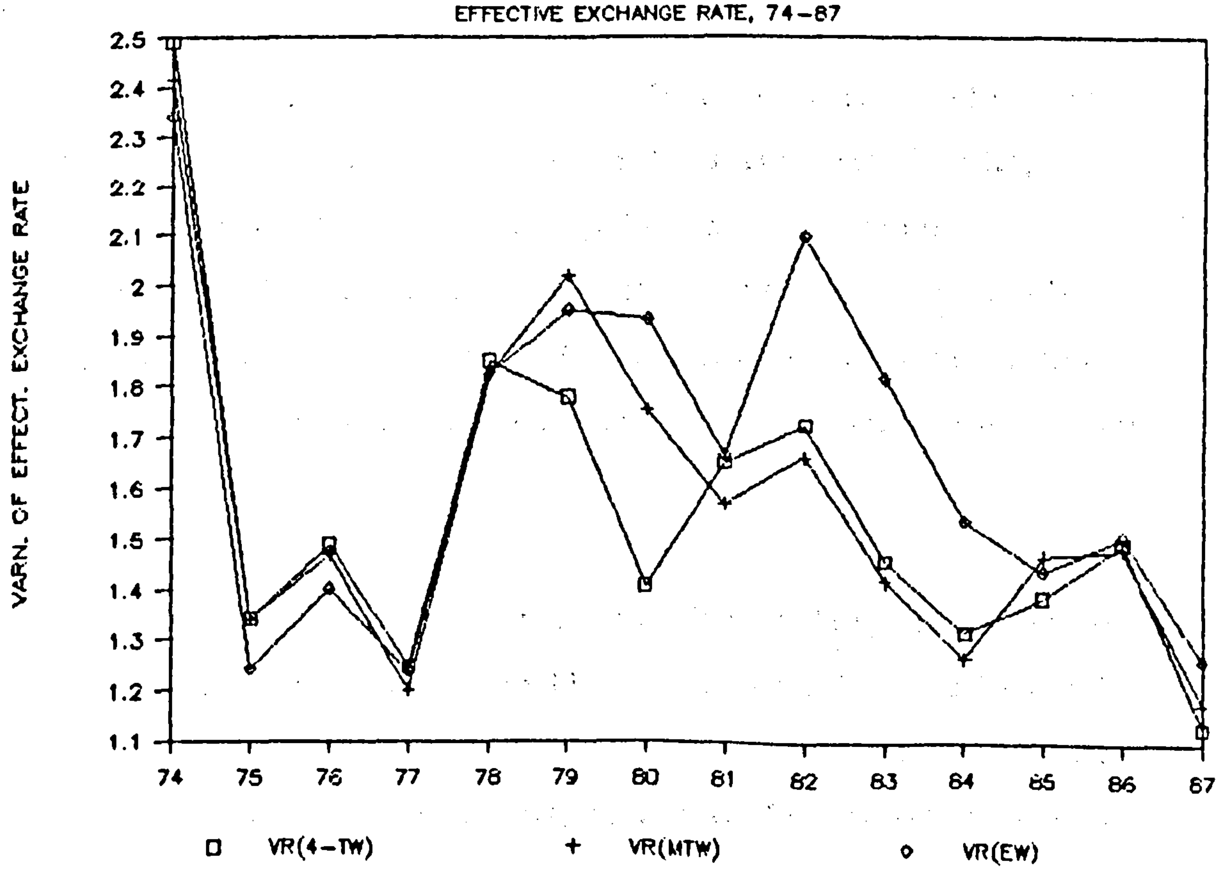


FIG.10.8 MEASURES OF VARIATION OF REAL EFFECTIVE EXCHANGE RATE, 74-87



should also take into account the shares of these countries in markets to which India exports. The basic criticism against all trade-weighted baskets is that they ignore (a) third-country competition and (b) the differences in domestic country's trade elasticities as among various trading partners. In order to eliminate these drawbacks, the currency basket has to be firstly, very broad and secondly, based on elasticity weights. Therefore, it is worth consideration whether to construct a multilateral exchange rate model for India on the lines of the IMF model for the OECD countries and generate currency weights depending on balance of trade elasticities.

10.4 Conclusion

A proper conduct of exchange rate policy requires an optimal exchange rate regime which determines the nominal exchange rate, and adjustments in the nominal exchange rate in order to preserve external balance. The basket peg provides the exchange rate regime for India but the present basket system does not appear to be optimal. One reason for the suboptimality of the Indian basket system arises from the role assigned in it to the pound sterling which involve costs which can be reduced by shifting that role to the dollar. More importantly, a large currency basket which should also include some of India's developing country competitors and which should be based on multilateral elasticity weights is preferable to a narrow currency basket based on bilateral trade weights.

Given the optimal exchange rate regime, it has to be operated with a view to preserving the country's external balance. That requires consideration for the medium-term trends in real exchange rate as well as the short-term fluctuations in that rate. In the emerging balance of payments situation in the country, with the existing level of short-term exchange rate instability in real terms, would necessitate a substantial real exchange rate depreciation to attain a sustainable current account balance in the medium term. However, the extent of depreciation of the exchange rate can be reduced with large gains on the current account by minimizing the short-run fluctuations in the real exchange rate. The policy of lowering of instability in the real exchange rate is possible if only extraneous considerations such as the minimization of speculation and inflation, and the stabilization of the dollar-rupee rate do not enter into India's exchange rate management in future.

Footnotes: Chapter 10

1. See the discussion in Section 3.3 of Chapter 3.
2. For the source of data in the construction of nominal and real effective exchange rate, see Chapter 9. The current account balance data is from Reserve Bank of India Bulletin. GDP data is from Government of India Economic Survey.
3. The rationale of trade liberalization for India can be seen from a number of studies on India's trade regime (see for example, Bhagwati and Desai, 1970; Bhagwati and Srinivasan, 1975; and Wolf, 1982). The lines on which India's trade liberalization is taking place can be understood from the Report of the Official Committee on Trade Policies (Abid Hussain Committee, 1984) and the government's statement on long-term fiscal policy (LTFP, 1985)
4. World real income increased at an average annual rate of 3.7 per cent during 1984-88 (Bank for International Settlements, Annual Report 1989, p. 10). Our assumption of 3 per cent growth in world economy for the next five years is consistent with the IMF projection of world output growth at 3.3 per cent and 3.2 per cent respectively for 1989 and 1990 (World Economic Outlook, April 1989, p. 4).
5. India's real GNP grew by an average 5.1 per cent per annum during the financial years, 1984-5 to 1988-9 (Government of India Economic Survey, 1988-89, p. 2). We assume a step up in the average growth rate in the next five years to 6 per cent per annum. The Approach Paper for the 8th Five Year Plan (1990-95) also envisages an annual growth rate of 6.0 per cent.
6. The wholesale price index recorded a rise of 6.5 per cent per annum during 1984-5 to 1988-89 (Government of India Economic Survey, 1988-89,

p. 2). We assume a lower rate of inflation at 5 per cent per annum during the next five years which is reasonable in the context of a larger output growth rate envisaged.

7. Industrial countries experienced an average rise of 1.5 per cent in wholesale price index during 1984-88 (International Financial Statistics, Yearbook 1988 and OECD Economic Outlook, April 1989). The assumption of doubling of this rate in the next five years at 3 per cent per annum is consistent with the IMF projection of accelerating inflation in industrial countries during 1989 and 1990 at 3.8 per cent and 3.5 per cent respectively (World Economic Outlook 1989, p. 4).

8. Based on the assessment in Government of India Economic Survey 1988-89.

9. According to official estimates, the total debt service liabilities of India have risen from 8.5 per cent of current earnings (merchandise exports plus gross invisible receipts) in 1979-80 to 12.1 per cent in 1984-85 and further to 24 per cent in 1987-88 (Government of India Economic Survey 1988-89, p. 122.)

10. We have not made allowance for growth in GDP through the export multiplier. This is, however, justifiable in the context of a very low (but nearly stable) share of exports in India's GDP at about 5 per cent in the last ten years.

11. Note that the measure of exchange rate instability we employ here, because of its inherent superiority over other measures in the context of India, is the real effective variation based on moving standard deviation, i.e., REVI. The minimum annual value for REVI was observed in 1971 and that was about 48.9 per cent below the average for the period 1968-86. 1971 was a year of considerable uncertainty in the international monetary system culminating in the collapse of the Brettan Woods par value system

and the initial floating of major currencies which had implications for rupee's exchange rate stability. In spite of these developments, 1971 constituted the year of lowest real exchange rate instability for the country.

12. See Footnote 10.

APPENDIX

Table A10.1 Projection of India's Current Account 1989-94: Three Scenarios

1. Estimated Export Equations

A. Manufacturing Products

(1) $XQM = 8.319 - 1.339\, REERM + .521\, WY - .297\, REV1_{-1}$

(2) $XPM = -4.134 + 1.214\, HPM + .597\, HA - .143\, REV1 + .197\, REV1_{-1}$

(3) $HPM = 6.548 - .292\, AS - .389\, AS_{-1} + .265\, IP - .152\, IP_{-1} + .084\, T$

B. Non-fuel Primary Products

(4) $XQP = 14.347 - 1.449\, REERP + 1.120\, WY - 1.105 HA - .818\, (XPP - HPP)_{-1}$

(5) $XPP = -.352 + .546\, FP + .980\, HPP - 1.022\, KFP - .184\, REV1$

$$+ .498\, (XPP - HPP)_{-1}$$

where all terms stand for the logarithms of the variables: XQM = quantity of manufactured exports, REERM = export-weighted real effective exchange rate relevant for manufactured exports, WY = world real income (export-weighted), XPM = domestic currency export price of manufactured products, HPM = domestic price of manufactures, AS = agricultural production, AS_{-1} = AS of the previous year, IP = domestic currency import price, IP_{-1} = IP of previous year, T = time trend, XQP = quantity of non-fuel primary exports, REERP = export-weighted real effective exchange rate relevant for primary exports, HA = real domestic absorption, XPP = domestic currency export price of non-fuel primary products, HPP = domestic price of primary products, $(XPP\text{-}HPP)_{-1}$ = the gap between XPP and HPP in the previous year, FP = export-weighted foreign price (FP^*) in domestic currency, KFP = fixed capital stock in the primary sector,

$REV1$ = annual average real effective variation measured through moving standard deviation of monthly percentage changes in exchange rates, and

$REV1_{-1}$ = REV1 of the previous year.

2. Impact of Exchange Rate Changes on Domestic Price

Equation (3) above estimates the impact of nominal exchange rate changes on domestic price of manufactured products through domestic currency import price (IP). We make a restrictive assumption that the impact of nominal exchange rate changes on domestic primary product prices are so negligible that it can be ignored. Therefore, the impact of exchange rate changes on the general price level (wholesale price index) is given by the former's effect on domestic manufacturing price multiplied by its weight in the all-commodity wholesale price index (HP), i.e., .583 (inclusive of the group, 'fuel, power, light and lubricants'). We further assume that the impact of exchange rate changes on the wholesale price index and that on the GDP deflator is the same. Applying these assumptions on equation (3) yields the result that a one per cent depreciation of nominal exchange rate would raise the domestic wholesale price index as well as the GDP deflator by .154 per cent in the first year but reduce it by .089 per cent in the second year, so that the long run effect is only .065 per cent.

3. Basic Assumptions Underlying the Projections

The annual growth rates in various explanatory variables during 1989-90 to 1993-94 are assumed to be:

Explanatory Variable	Annual Growth Rates (%) Assumed
WY	3
FP*	3
real GNP/GDP/HA	6
HPM/HPP/HP/GDP deflator	5 (excluding exchange rate effect)

In addition, we assume the following relating to the Indian current account in the next five years:

a) As a result of import liberalization, the rupee value of imports would grow in such a way as to raise its share in nominal GDP from 8 per cent in 1989-90 to 8.1 per cent in 1990-91, 8.2 per cent in 1991-92, 8.3 per cent in 1992-93, and to 8.4 per cent in 1993-94. Exchange rate and its instability are assumed to have no impact on imports.

b) The rupee value of exports would get an additional boost due to liberalization to the extent of 2 per cent in 1989-90, 2.5 per cent in 1990-91, 3.0 per cent in 1991-92, 3.5 per cent in 1992-93, and 4 per cent in 1993-94.

c) The net inflow of invisibles in rupee terms would remain at the estimated 1988-89 level of Rs. 3600 crores in each of the next five years.

4. Projection Results

Scenario 1

Under this scenario, the NEER is depreciated just to compensate for the differential between home and foreign inflation. The inflation differential is 2 per cent which requires slightly higher than 2 per cent annual depreciation of the NEER taking into account the domestic price effect of the NEER depreciation. The required NEER depreciation under Scenario 1 is given below.

Year	NEER depreciation (%)
1989-90	2.36
1990-91	2.12
1991-92	2.14
1992-93	2.14
1993-94	2.14

The volume of exports under this scenario would respond only to WY and HA and the export price to HPM (including the NEER effect), HA, HPP and NEER (through FP). We do not take into account any effect on exports that would occur through changes in fixed capital stock in this or any other alternative scenarios. Under this scenario we also do not envisage any export growth due to reduction of real exchange rate instability as we assume that the level of instability remains the same.

We worked out the annual growth in export value (export volume growth plus export price growth) separately for the manufactured products and the primary products and combine them to get the aggregate export growth using the 1979-81 export share weights (.641 for manufactured products and .359 for primary products). To the resulting growth rates we add the additional growth due to liberalization and finally obtain the following domestic currency export growth rates during the projected period.

Year	Projected Annual Export Growth (%)
1989-90	10.72
1990-91	11.30
1991-92	11.79
1992-93	12.29
1993-94	12.79

The projection of India's current account in the next five years under Scenario 1 is given below on the next page.

Scenario 1: Projection of Current Account, 1989-94 (Rs. Crores)

Items	1988-89[a] (Base)	1989-90	1990-91	1991-92	1992-93	1993-94
Exports	20939	23184	25803	28846	32391	36534
	(5.5)	(5.4)	(5.4)	(5.5)	(5.5)	(5.6)
Imports	32023	34151	38423	43230	48632	54701
	(8.4)[b]	(8.0)	(8.1)	(8.2)	(8.3)	(8.4)
Trade Balance	-11084	-10967	-12620	-14384	-16241	-18167
	(-2.9)	(-2.6)	(-2.7)	(-2.7)	(-2.8)	(-2.8)
Invisibles (net)	3600	3600	3600	3600	3600	3600
	(0.9)	(0.8)	(0.8)	(0.7)	(0.6)	(0.6)
Current Account	-7484	-7367	-9020	-10784	-12641	-14567
Balance	(-1.95)	(-1.73)	(-1.90)	(-2.05)	(-2.16)	(-2.24)

a. Estimated actuals based on provisional figures for merchandise trade and indications for GDP and net invisibles given in Government of India Economic Survey, 1988-89.

b. The high import-GDP ratio in 1988-89 is due to exceptional causes such as the unusually high international prices of metals and edible oils and the large imports of essential commodities such as foodgrains to build up stocks depleted by the previous year's unprecedented drought.

Note: Figures in parentheses are percentages to GDP at current market prices.

Scenario 2

Under Scenario 2, which assumes an annual 8 per cent REER depreciation, the NEER depreciation required is given below:

Year	NEER depreciation (%)
1989-90	11.82
1990-91	10.58
1991-92	10.71
1992-93	10.70
1993-94	10.70

The aggregate export growth under Scenario 2 has been worked out as under:

Year	Projected Annual Export Growth (%)
1989-90	25.55
1990-91	23.34
1991-92	24.56
1992-93	25.07
1993-94	25.57

The current account projections under Scenario 2 would be as:

Scenario 2: Current Account Projections, 1989-94 (Rs. crores)

Items	1988-89 (Base)	1989-90	1990-91	1991-92	1992-93	1993-94
Exports	20939	26289	32425	40388	50514	63430
	(5.5)	(6.1)	(6.7)	(7.5)	(8.4)	(9.4)
Imports[a]	32023	34151	38423	43230	48632	54701
	(8.4)	(7.9)	(8.0)	(8.0)	(8.1)	(8.1)
Trade Balance	-11084	-7862	-5998	-2842	1882	8729
	(-2.9)	(-1.8)	(-1.2)	(-0.5)	(0.3)	(1.3)
Invisible (net)	3600	3600	3600	3600	3600	3600
	(0.9)	(0.8)	(0.7)	(0.7)	(0.6)	(0.5)
Current Account	-7484	-4262	-2398	+758	+5482	+12329
Balance	(-1.95)	(-0.99)	(-0.50)	(+0.14)	(+0.91)	(+1.83)

a. The import-GDP ratio is slightly different from Scenario 1 due to the price effect of larger NEER changes on nominal GDP

Note: Figures in parentheses are percentages of GDP at current market prices.

Scenario 3

Scenario 3 envisages, besides the Scenario 1 assumption of constant REER throughout the projection period, a lowering of real exchange rate instability by 48.9 per cent in order to attain the minimum exchange rate instability of the past period. The reduction of real exchange rate instability alone would bring about an additional export growth. The extra growth in exports due to lowering of exchange rate instability to the prescribed level is indicated below for the aggregate exports as well as for the two disaggregated sectors separately:

Year	Additional Export Growth with Low Exchange Risk		
	Manufactured Products	Primary Products	Aggregate Exports
1989-90	6.99	9.00	7.71
1990-91	11.88	17.95	14.06
1991-92	11.88	17.95	14.06
1992-93	11.88	17.95	14.06
1993-94	11.88	17.95	14.06

Taking into account the above additional export growth through the reduction in exchange risk, the current account projections for the next five years under Scenario 3 would look like as in the table given below.

Scenario 3: Projection of Current Account, 1989-94

Items	1988-89 (Base)	1989-90	1990-91	1991-92	1992-93	1993-94
Exports	20939	24798	31087	39123	49432	62704
	(5.5)	(5.8)	(6.6)	(7.4)	(8.4)	(9.6)
Imports	32023	34151	38423	43230	48632	54701
	(8.4)	(8.0)	(8.1)	(8.2)	(8.3)	(8.4)
Trade Balance	-11084	-9353	-7336	-4107	+800	+8003
	(-2.9)	(2.2)	(-1.5)	(-0.8)	(+0.1)	(+1.2)
Invisibles (net)	3600	3600	3600	3600	3600	3600
	(0.9)	(0.8)	(0.8)	(0.7)	(0.6)	(0.6)
Current Account Balance	-7484	-5753	-3736	-507	+4400	+11603
	(-1.95)	(-1.35)	(-0.79)	(-0.10)	(+0.75)	(+1.78)

Note: Figures in parentheses are percentages to GDP at current market prices

Chapter 11
Conclusion

The mainstream theoretical and empirical literature on LDC exchange rate regimes, although voluminous, have failed to highlight the specific features of the new exchange rate regimes that have emerged since the demise of the universal "adjustable peg" system. The thesis could provide considerable insight into the Indian post-Bretton Woods exchange rate regime.

A proper conduct of exchange rate policy importantly requires an exchange rate regime which has to be established on "internal balance" considerations, i.e., with a view to shield the domestic economy from disturbances imposed by the day-to-day third country currency fluctuations. While it is true that a basket peg is well suited to the Indian situation, our study casts doubts on the optimality of India's present basket system. A broad currency basket including also currencies of some of India's LDC competitors in third markets, with a weighting system based on balance-of-trade elasticities derived from an appropriately constructed multilateral exchange rate model, constitutes the optimal currency basket for India. Besides, in an optimal peg for the country, it is the dollar, instead of sterling, that should be the currency of valuation, designation and intervention.

The exchange rate regime determines the day-to-day <u>nominal</u> exchange rates. However, what is important for external balance is the medium-term trend as well as the short-term volatility in the real exchange rate. For instance, one can achieve a targeted improvement in current account either by a decline in the medium-term trend in the real exchange rate (real depreciation) or by a decline in the short-run fluctuations in the real exchange rate or a combination between the two. Therefore, while adjusting the nominal exchange rate for the external balance purpose, authorities have options with regard to both medium-term trend and short-term fluctuations. An important contribution of our study lies in highlighting the option involving the latter which has been largely ignored in the literature on LDC exchange rate policy.

In the context of India, the operation of exchange rate policy in the past has led to high exchange rate instability in real terms which involved high exchange risk for economic agents. Our study could demonstrate the high cost of exchange risk for India in terms of lost exports, disaggregated into manufactured and non-fuel primary products. The high exchange rate instability associated with the Indian exchange rate management has been shown to be a case of the authorities' attempts to achieve far too many things through the exchange rate policy ending up with achieving far too little. The balance of payments situation in India remained uncomfortable throughout the 1980s and appears to worsen in the 1990s.

In every discussion of LDCs subject to chronic balance of payments deficit, concern is mostly raised about the overvaluation of the home currency and the need to depreciate the currency to an appropriate level. Very seldom the question is asked about the short-term instability of the exchange rate and the large gains on current account that can be had by lowering the short-term exchange rate instability. Our study on India shows clearly that the equilibrium exchange rate cannot be divorced from the short-term stability of the exchange rate. This, in fact, opens up an area for future research in the context of other LDCs subject to chronic balance of payments problems.

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