EXCHANGE RATE MISALIGNMENT IN DEVELOPING COUNTRIES*

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ABSTRACT

This paper deals with several analytical issues related to exchange rate disequilibrium (i.e. overvaluation and undervaluation) in the developing countries. We first analyze the theory of equilibrium real exchage rates, defining precisely what we mean by real exchange rate misalignement. The role of macroeconomic policies under three alternative nominal exchange rate regimes is then analyzed. We consider the cases of predetermined nominal exchange rates, floating nominal rates, and nonunified nominal exchange rates (i.e. dual or parallel markets). This discussion emphasizes the casual relation that goes from inconsistent macroeconomic policies to real exchange rate misalignement. We finally address the issue of real exchange rate realignement, emphasizing the role of nominal devaluations as a way of correcting real exchange rate disequilibrium.

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I. Introduction

The purpose of this paper is to analyze a number of issues related to real exchange rate disequilibrium (i.e., overvaluation and undervaluation) in the developing countries. In the last few years exchange rates problems have attained great prominence in economic and policy discussion in the developing nations. For example, it has been argued that the inappropriate exchange rate policies pursued by a number of countries in the late 1970s contributed in an important way to the unleashing of the international debt crisis in the early 1980s. According to the World Bank (1984), the maintenance of overvalued exchange rates in many African countries has resulted in a dramatic deterioration in their agricultural sector and external position. Still other experts have postulated that the failure to sustain an adequate exchange rate policy triggered the disappointing outcome of the Southern Cone (Argentina, Chile and Uruguay) economic reforms and free market policies during the late 1970s.

Policymakers are regularly confronted with problems related to exchange rate behavior. Questions like: Is the real exchange rate misaligned? How will exchange rate policy affect the agricultural sector? How will a devaluation affect the country's ability to service its debt? and so on, are very common. In fact, nowadays it is difficult to tackle macroeconomic

problems in the developing countries without addressing exchange rate issues.

One of the most important and current exchange rate problems is related to determining whether a country's real exchange rate is misaligned, or out of line with respect to its long-run equilibrium value. There is general agreement that maintaining the real exchange rate at the "wrong" level results in significant welfare costs. On one hand, it generates incorrect signals to economic agents; on the other, it results in greater economic instability (Willet 1986). Once it is determined that the exchange rate in a particular country is indeed misaligned, it is important to consider alternative ways of handling this disequilibrium. In that regard, some of the more critical issues relate to the effectiveness of nominal devaluations to restore real exchange rate equilibrium, and to the desirability of using alternative tools to face the misalignment problem.

In this paper we analyze at a general, and fairly nontechnical level, several issues related to real exchange rate behavior and real exchange rate misalignment. Part One deals, in general terms, with the theory of equilibrium and disequilibrium real exchange rates, and with the interaction between macroeconomic policies and real exchange rate movements. In Section III real exchange rate misalignment is defined as sustained departures of the actual real exchange rate from its equilibrium path. It is argued that a necessary step in understanding real exchange rate movements consists of developing a well articulated framework for the analysis of equilibrium changes in the real exchange rate. Only to the extent that it is well understood how equilibrium real exchange rates move, can we evaluate whether an exchange rate is out of line or misaligned.

The role of macroeconomic policies is analyzed for three alternative nominal exchange rate regimes: predetermined nominal exchange rates, floating nominal rates, and nonunified nominal exchange rates (i.e., dual or black markets). This discussion strongly emphasizes the causal relation that goes from inconsistent macroeconomic policies to real exchange rate misalignment.

Part Two of the paper deals with real exchange rate realignment. The discussion focuses primarily on the case of predetermined nominal exchange rates -- the most common exchange rate regime in the developing nations --, emphasizing the potential role of nominal devaluation as a way of correcting real exchange disequilibria. This part starts by discussing the limitations and costs associated with the use of disinflation (or automatic adjustment) as the only mechanism to bring the real exchange rate back to equilibrium. The theory of devaluation is discussed next. Here we also analyze the use of other policies aimed at directly affecting relative prices, and compare their effects to those of outright devaluation. The interaction between devaluation and accompanying macroeconomic policies is analyzed in detail, and we argue that devaluations will succeed only to the extent that they are supported by consistent macroeconomic policies. Next we briefly analyze the existing empirical evidence on the effectiveness of devaluation. The paper ends with a brief section on the historical evidence regarding the effectiveness of nominal devaluations as policy tools.

This paper is supplemented with some appendices providing both empirical and technical background material to the issues discussed; there are frequent references to the accompanying appendices. These appendices are available from the author upon request.

PART I:

THE ECONOMICS OF REAL EXCHANGE RATES

II. Preliminary Concepts

This section provides a brief introduction to the economics of real exchange rates. We start by developing some basic concepts, and by defining what we exactly mean by real exchange rate (RER). We then analyze the relation between real exchange rates and the degree of competitiveness in a particular country, emphasizing the difference between "justified" (i.e., equilibrium) and "unjustified" (or disequilibrium) changes in real exchange rates. We point out that since "justified" changes in RERs -- generated by technological change, for example -- are an equilibrium phenomenon, they usually don't require government intervention. "Unjustified" movements of RER, however, are a different matter since they represent a situation that is not sustainable in the long run. This type of disequilibrium will be costly and will generally require some type of government action.

In recent years the distinction between nominal and real exchange rates has become increasingly important. While the nominal exchange rate is a monetary concept that measures the relative price of two monies, the real exchange rate is, as the name indicates, a real concept that measures the relative price of two goods.[1] More specifically, the real exchange rate (RER), is defined as the relative price of tradables with respect to non-tradables goods:[2]

$$RER = \frac{\text{Price of Tradable Goods}}{\text{Price of Nontradable Goods}} \qquad (2.1)$$

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[1] On macro and exchange rate policies inconsistencies and devaluation crises see Appendix VI.

[2] Although this definition is the most common one, there is still some confusion on what people exactly mean by "the" real exchange rate. See Appendix I for a detailed discussion on alternative definitions. Another difficult question relates to how to measure the real exchange rate. See Appendix III for a discussion on the subject.

An important property of the RER is that it is a fairly good proxy of a country's degree of international competitiveness. Indeed, the RER measures the cost of producing domestically the tradable goods. A decline in the RER, or a real exchange rate appreciation, reflects the fact that there has been an increase in the domestic cost of producing tradable goods. If there are no changes in relative prices in the rest of the world, this decline in RER represents a deterioration of the country's degree of international competitiveness: the country now produces tradable goods in a relatively (that is relative to the rest of the world) less efficient way than before. The interpretation of an increase in the relative price of tradables of RER, or real depreciation is perfectly symmetrical, and represents an improvement in the degree of international competitiveness.[3]

Sometimes these changes in a country's degree of international competitiveness are "justified" by real events in the economy, such as technological progress, changes in external terms of trade, changes in taxation, and so on. These "justified" changes in international competitiveness are an equilibrium phenomenon and will not require policy intervention. There are situations, however, when there are "unjustified" departures of the actual RER from its equilibrium value. In this case we have a situation of real exchange rates disequilibrium, or what has come to be known as real exchange rate misalignment. Being able to distinguish equilibrium from disequilibrium movements in RERs has in fact become one of the major challenges for macroeconomic analysts. In the sections that follow we analyze in detail different aspects of equilibrium and disequilibrium real exchange rates.

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[3] In theory there are better indexes of a country's international degree of competitiveness, such as unit labor costs. Unfortunately, these type of indexes are very unreliable in the case of the developing countries.

In order to have a meaningful discussion on real exchange rate disequilibrium and overvaluation it is first necessary to define what we exactly mean by equilibrium real exchange rates. The equilibrium RER is a general equilibrium concept, and is defined as the relative price of tradables to nontradables that results in the simultaneous attainment of equilibrium in the external sector and in the domestic (i.e., nontradables) sector of the economy. This means that when the RER is in equilibrium the economy is accumulating (decumulating) assets at the "desired" rate, and the demand for domestic goods equates its supply (see Section III and Appendix II for further discussions).

While the definition of RER given in equation (2.1) is analytically useful, it is difficult to calculate in real life situations. A more operational definition of the real exchange rate is the following:

$$RER = \frac{EP_T^*}{P_N} , \tag{2.2}$$

where E is the nominal exchange rate defined as units of domestic currency per unit of foreign currency, P_T^* is the world price of tradables and P_N is the domestic price of nontradables. In measuring (2.2) economists have to define proxies for P_T^* and P_N. These proxies are usually some foreign price level (wholesale price index, for example), and the domestic CPI. In Appendix I a long discussion on measurement problems is provided.

III. Determinants of the Equilibrium Real Exchange Rate

In this section we investigate the theory of equilibrium real exchange rates (ERER) in greater detail. In order to simplify the discussion, we concentrate on the role of the real determinants of the equilibrium real exchange rate, and relegate all monetary considerations to Section IV.

The equilibrium RER is that relative price of tradables to nontradables that, for given (equilibrium or sustainable) values of other relevant variables such as trade taxes, international prices, capital and aid flows, and technology, results in the simultaneous attainment of internal and external equilibrium. In this context, internal equilibrium is defined as meaning that the nontradable goods market clears in the current period, and is expected to be in equilibrium in future periods.[4] External equilibrium, on the other hand, is attained when the current account balance in the present period, and the expected current account balances in future periods, satisfy the intertemporal budget constraint that states that the discounted value of the current account balances has to be equal to zero. In other words, external equilibrium means that the current account balances (current and future) are compatible with long run sustainable capital flows.[5]

A number of important implications follow from this definition of equilibrium real exchange rate. First, the ERER is not an immutable number. When there are changes in any of the other variables that affect the country's internal and external equilibria, there will also be changes in the equilibrium real exchange rage. For example, the RER "required" to attain

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[4]Implicit in this definition is the requirement that there are no deviations from natural rate of unemployment. In fact, internal equilibrium -- defined as a nontradables market that clears -- can take place at different levels of employment. In our definition of equilibrium RER it is implicit the idea that this equilibrium takes place with no unemployment above its natural level.

[5]This intertemporal budget constraint can be written in the following way: $\Sigma_i (1+r)^{-i} C_{t+i} = 0$, and states that this country cannot be a net lender or net borrower forever. Eventually it has to pay its debts. For a formal and technical discussion on the equilibrium real exchange rate see Appendix II, where an intertemporal general equilibrium model is defined. See also the discussion in Williamson (1983).

equilibrium will not be the same with a very low world price of the country's main export, than with a very high price of that good. In a sense, then, the ERER is itself a function of a number of variables including import tariffs, export taxes, real interest rates, capital controls and so on. These immediate determinants of the ERER are called real exchange rate fundamentals. Second, there is not "one" equilibrium real exchange rate, but rather a path of equilibrium RERs through time. Third, the path of ERER will not only be affected by the current values of the fundamental determinants, but also by the expected future evolution of these variables. To the extent that there are possibilities for intertemporal substitution of consumption via foreign borrowing and lending, and in production via investment, expected future events -- such as an expected future change in the international terms of trade, for example -- will have an effect on the current value of the ERER.

III.1 Real Exchange Rate Fundamentals

The fundamental determinants of the ERER are those real variables that, in addition to the RER, play a major role in the determination of the country's internal and external equilibrium. These variables and the RER jointly determine the country's internal and external equilibrium position. Although in reality there are a very large number of such variables, in analytical and policy discussion it is useful to concentrate on the more important ones. In order to organize the discussion it is helpful to classify the real exchange rate fundamentals into two broad categories: (1) external fundamentals, and (2) domestic real exchange rate fundamentals.

The external RER fundamentals include: (a) international prices (i.e., international terms of trade); (b) international transfers, including foreign aid flows; and (c) world real interest rates.

The domestic RER fundamentals can be further divided into those

variables that are policy related, and those that are independent of policy decisions. Among the more important policy related RER fundamentals we can find: (a) import tariffs, import quotas and export taxes; (b) exchange and capital controls; (c) other taxes and subsidies; and (d) the composition of government expenditure. Among the domestic non-policy fundamentals, technological progress is the most important.[6]

Changes in taxes or subsidies on commodity trade will have important effects on the equilibrium real exchange rate. Consider, for example, the imposition of a (permanent) import tariff. This will result in an increase in the domestic price of importables that will generate both substitution and income effects, resulting in a reduction in the demand for importables, and in the volume of imports. The increase in the domestic price of importables will also induce (under substitutability) a higher demand for nontradable goods, generating an increase in their prices. Thus, under the most plausible conditions in terms of substitution and income effects,[7] the higher import tariff will result in a new equilibrium characterized by a lower price of exportables relative to nontradables, and a higher price of importables relative to exportables.[8]

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[6]Naturally not only these variables have an effect on the ERER, but in many cases the relation will go both ways, with changes in the RER also affecting some of the fundamentals. Perhaps the most clear example of this two-way relation has to do with RER movements and tariffs. It is usually the case that real exchange rate overvaluation is met by an increase in exchange controls and tariffs.

[7]These "plausible conditions" are that the substitution effect dominates the income effect, and that all goods are gross substitutes in consumption. See Edwards (1986b).

[8]Notice that since a tariff affects the relative price of importables to exportables, it is useful to concentrate on both the relative prices of exportables and importables. Depending on the relative weights of importables and exportables in the price index for tradables, the ERER will appreciate or depreciate as a consequence of the imposition of an import

Changes in the international terms of trade will also have important effects on the ERER. From an analytical perspective a deterioration in the terms of trade and the imposition of an import tariff have somewhat similar effects. On the substitution side both shocks imply a higher domestic price of importables, and are translated into a reduction of the quantity demanded of these goods. Although in both cases the income effects are negative, their magnitude is quite different; a worsening in the international terms of trade has a significantly more negative income effect than a tariff hike. Although, as discussed in more detail in Appendix II, from a purely theoretical perspective it is not possible to know a priori the effect of a terms of trade worsening on the ERER, the existing empirical evidence suggests that terms of trade deteriorations usually leads to an equilibrium real depreciation (i.e., to a higher ERER).

The relaxation or imposition of controls on capital movements will affect intertemporal consumption, and thus the path of equilibrium relative prices and real exchange rates. For example, a relaxation of capital controls that result in an increase in capital inflows and foreign borrowing will result in higher current expenditure on all goods, including nontradables. As a result of this, and in order to maintains internal equilibrium in the current period there will be an increase in the price of nontradables or equilibrium real appreciation. The case of changes in real interest rates is similar.

The case of international transfers provides another example of a fundamental variable affecting the equilibrium path of RER. If, for

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tariff. What is clear, however, is that the relative price of importables has gone up relative to both nontradables and exportables, while the relative price of exportables will fall relative to the other two goods. See Appendix II.

example, a country has to make a transfer to the rest of the world, current and future domestic real income and expenditure will fall, generating a fall in the relative price of nontradables or a real depreciation in the current and future periods. The case of a positive transfer is symmetrical, and particularly relevant for those less developed countries that receive foreign aid. Analytically, aid is a transfer from the rest of the world, and as such it will generate an equilibrium real appreciation. That is, and perhaps paradoxically, foreign aid will reduce the degree of international competitiveness in the recipient country, making the country's exports less competitive internationally.

Changes in the composition of government expenditures towards a greater proportion on nontradables will provoke excess demand pressures in that market, and will result in a higher relative price nontradables or real appreciation.

The fact that the equilibrium real exchange rate moves when its fundamental determinants change has important consequences for policy evaluation. It is still common to find among some policymakers the view that the equilibrium real exchange rate is a constant or immutable number. According to this approach, which is partially based on the simplest version of Purchasing Power Parity theory, any deviation of the real exchange rate from its value in some past period (usually called "the equilibrium year"), represents a disequilibrium situation, and is a cause for concern. On the contrary, according to the view presented in this paper -- and to most modern approaches -- actual changes in RERs do not necessarily reflect a disequilibrium situation. They can indeed reflect changes in equilibrium conditions generated by changes in fundamentals. The policymaker challenge, in fact, is to determine whether changes in the actual (i.e., measured) real

exchange rate respond to changes in the fundamentals, or if they in fact represent a disequilibrium situation.

IV. The Real Exchange Rate, Macroeconomic Policy and Real Exchange Rate Misalignment

Although the equilibrium real exchange rate is a function of real variables only, the actual real exchange rate responds both to real and monetary variables. The existence of an equilibrium value of the real exchange rate does not mean that the actual real rate has to be permanently equal to this equilibrium value. In fact, the actual RER will normally exhibit short run departures from its equilibrium value. Short run and even medium run deviations that are typically not very large and that stem from short term frictions and adjustment costs, can be quite common. However, there are other types of deviations that can become persistent through time, generating major and sustained differentials between actual and equilibrium real exchange rates, or real exchange rate misalignments.

At any moment in time, the actual or observed real exchange rate will depend on the values of the fundamentals (i.e., tariffs, international prices, real interest rates and so on) and also on aggregate macroeconomic pressures, such as excess supply for money and fiscal deficit. In this section we discuss the interaction between macroeconomic policies and real exchange rate behavior. In the discussion we make a distinction between three different exchange rate regimes: (1) fixed nominal exchange rates, and its variants including managed and crawling rates; (2) floating rates; (3) and nonunified exchange rate systems, including dual rates and the case where a significant parallel foreign exchange market coexist with the official market.

IV.1 The Case of Predetermined Nominal Exchange Rates

A fundamental principle of open economy macroeconomics is that in order to have a sustainable macroeconomic equilibrium it is necessary that monetary and fiscal policies are consistent with the chosen nominal exchange rate regime. This means that the selection of an exchange rate system imposes certain limitations on the extent of macropolicies. If this consistency is violated severe disequilibrium situations, which are usually reflected on the real exchange rate misalignment, will take place.

Perhaps the case of a "high" fiscal deficit under fixed nominal rates is the most clear example of macro and exchange rate inconsistencies. In most developing countries fiscal imbalances are partially or wholly financed by money creation. The inflation required to finance a fiscal deficit equal to a fraction δ of GDP can be calculated as:

$$\pi = \delta/\lambda \tag{4.1}$$

where π is the rate of inflation required to finance the government deficit, and λ is the ratio of high-powered money to GDP.[9] If, for example, a country has a fiscal deficit of 8% of GDP and its stock of base money represents 20% of GDP, the required rate of inflation will be 40% per annum. If the required rate of inflation is as high as in this example, there will generally be an inconsistency between the fiscal deficit and the maintenance of a fixed nominal exchange rate. Since the domestic price of nontradables increases at a rate approximately equal to the rate of inflation, and the domestic price of tradables grows at approximately the

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[9] The increase in high power money required to finance a deficit equal to a fraction δ of GDP can be written as: $\Delta M/P = \delta G$. In equilibrium $\Delta M/M$ is equal to the rate of inflation, and thus equation (4.1) follows.

rate of world inflation,[10] a real appreciation will take place every period.

Monetary policy is another potential source of macroeconomic inconsistencies. Under predetermined nominal exchange rates, increases in domestic credit at rates that exceed the growth in the demand for domestic money will be inconsistent with the maintenance of the fixed nominal rate. Under these circumstances the excess of domestic credit creation above money demand growth will be translated into an excess demand for tradable goods, nontradable goods, and financial assets.[11] While the excess demand of tradables will be reflected in a higher trade deficit (or lower surplus), in a loss of international reserves, and in an increase in (net) foreign borrowing above its long run sustainable level, the excess demand for nontradables will be translated into higher prices for those goods, and consequently into a real exchange rate appreciation. If there are no changes in the fundamental real determinants of the ERER this real appreciation induced by the expansive domestic credit policy will represent a departure of the actual RER from its equilibrium value, or real exchange rate misalignment.

The consistency between monetary and exchange rate policies is not only needed under fixed rates, but also under most types of predetermined and managed nominal exchange rates such as passive crawling pegs. Perhaps Argentina in the late 1970s is the most notorious recent case of an inconsistent fiscal and crawling nominal exchange rate policies. During that period the

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[10] The domestic price of tradables is equal to $P_T = EP^*_T \tau$, where P^*_T is the international price of tradables, E is the nominal exchange rate and τ is one plus the tax on tradables. If the exchange rate is fixed and there are no changes in τ, P_T will increase at approximately the rate of world inflation.

[11] Notice that here we are considering monetary policy as different from the fiscal problem discussed above. In reality, however, both of these problems can be considered as related. This is because in the vast majority of the developing sections government deficits are financed by money creation.

Argentinian government implemented the by-now famous preannounced rate of devaluation or "tablita" as a means to reduce inflation. However, the pre-announced rate of crawl was clearly inconsistent with the inflation tax required to finance the fiscal deficit (Calvo 1986). This inconsistency not only generated a real appreciation but also substantial speculative activity, where the public basically bet on when the "tablita" would be abandoned.

IV.2 Real Exchange Rates and Macroeconomic Policy Under Freely Fluctuating Nominal Exchange Rates

Under a floating system the nominal exchange rate fluctuates freely, and its value responds to changes in macroeconomic policies. However, domestic prices and nominal exchange rates will adjust to shocks at different speeds. A crucial difference between nominal exchange rates and goods prices is that the exchange rate behaves like an asset price, being extremely responsive to changes in expectations and to the availability of new information. Partially as a consequence of this, industrial countries' nominal exchange rates have been very volatile since the abandonment of the Bretton Woods system in 1971. On the other hand, for a number of reasons, including the existence of contracts and adjustment costs, goods prices usually react much slower than exchange rates.

The existence of a floating system does not preclude, in any way, the influence of monetary policies on the behavior of actual real exchange rates. In fact, the very wide swing in real exchange rates observed in the industrial countries in the last few years have become an important topic of analysis by policymakers, academics and the media.[12]

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[12] See Williamson (1983) for a meticulous analysis of the possibilities of RER misalignment under floating rates. Monetary policies, however, still don't affect equilibrium real exchange rates. These depend, under any nominal exchange rate regime, on real variables only.

The clearer case where monetary policies induce changes of the actual RER has been analyzed by Dornbusch (1976) in his celebrated exchange rate overshooting article. Assuming that asset (including foreign exchange) markets adjust instantaneously, while nontradable goods markets adjust only slowly, a monetary expansion will result in an instantaneous jump of the nominal exchange rate that will exceed the long run equilibrium nominal depreciation.[13] Prices of nontradables, on the other hand, will remain constant in the short run. As time passes, however, domestic prices will increase towards their new equilibrium level compatible with the higher stock of money, and the nominal exchange rate will decrease towards its new post monetary expansion equilibrium. Figure 1 summarizes the dynamic behavior of nominal exchange rates (E), domestic prices (P) and the real exchange rate following a monetary expansion in Dornbusch's overshooting model. To the extent that nothing has happened to the real fundamental determinants of the equilibrium real exchange rate, the movement of RER recorded in Figure 1B represents a (short-run) departure of actual fromequilibrium RER, or misalignment.[14]

In sum, while under floating rates the issue of consistency between macro and exchange rate systems does not arise directly, the short run volatility of the nominal exchange rate is a source of important departures of actual RER from the long run equilibrium RER, or real exchange rate misalignment. Moreover, since nominal exchange rates are very sensitive to expectations and new information, the sources of departure between RER and

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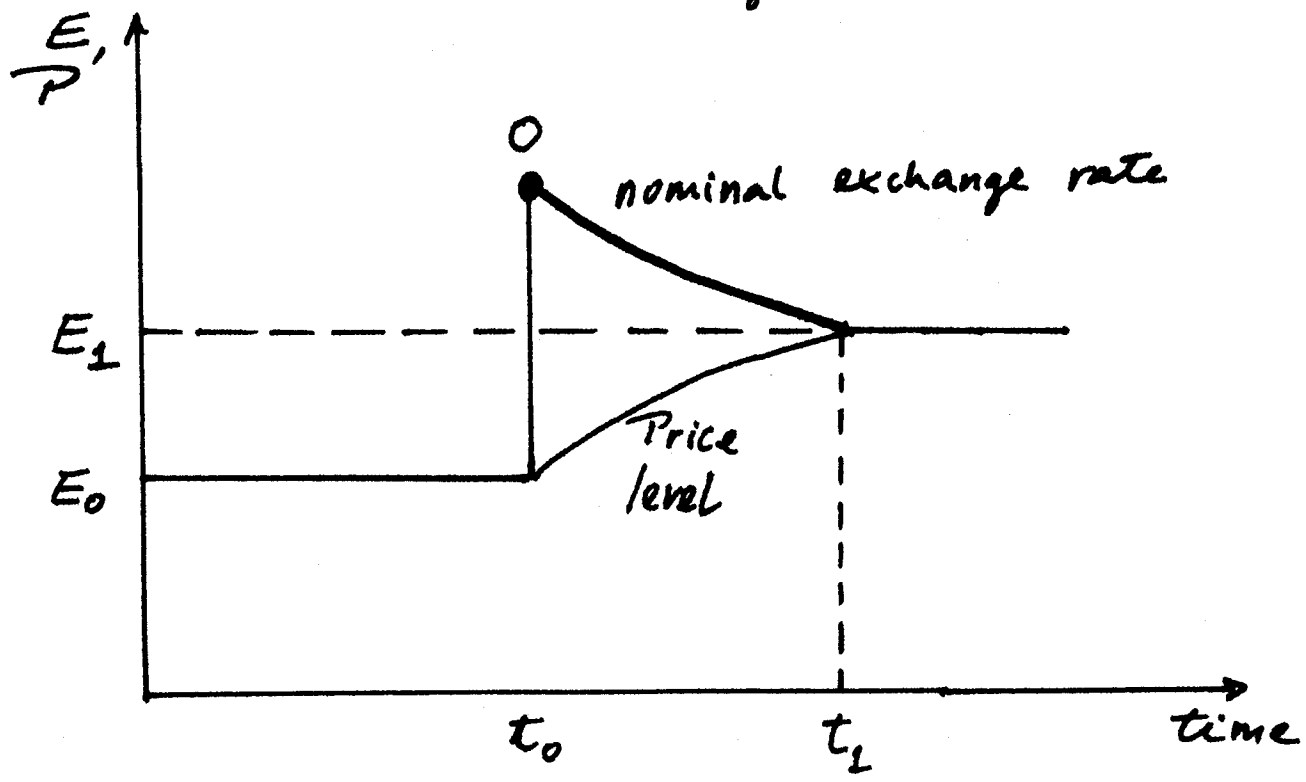
[13]The overshooting in the nominal rate is required in order for interest arbitrage to hold permanently. See Dornbusch (1976).

[14]Notice that the direction of the departure of RER from ERER is the opposite than under fixed rates.

1.a. Nominal Exchange Rate and Price Behavior Following Monetary Shock



1.b. Real Exchange Rate

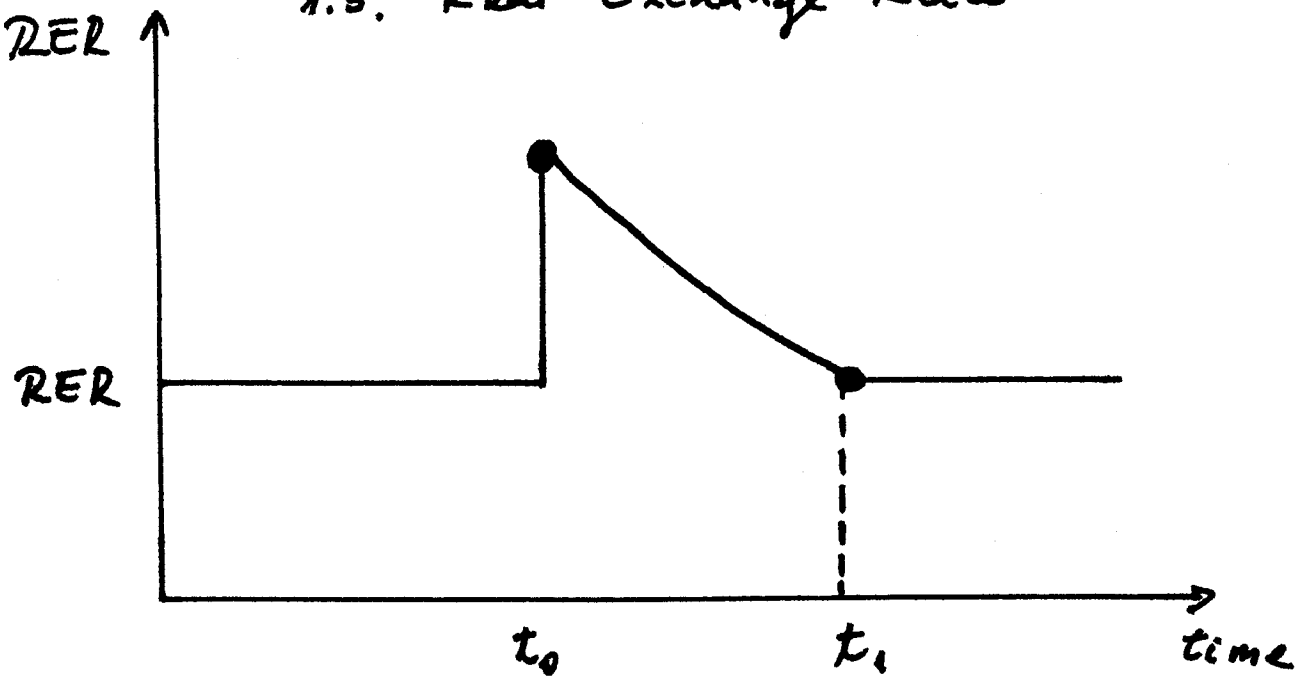


Figure 1: Dornbusch's Overshooting Model.

ERER may under some circumstances be even greater than under fixed rates.

IV.3 Macroeconomic Policies and the RER in the Presence of Parallel Nominal Exchange Rate Markets

Nonunified (or multiple) nominal exchange rates have traditionally had some appeal for the developing countries, and have recently become fairly common. Under this type of system different international transactions are subject to differential nominal exchange rates, giving rise to the possibility of having more than one real exchange rate.[15]

Under nonunified exchange rates, the relation between macroeconomic policies and the rest of the economy will depend on the nature of the multiple rates system. If, for example, the multiple rates regime consists of two (or more) predetermined (i.e., fixed) nominal rates, the system will work almost in the same way as under unified predetermined nominal rates. This is because multiple fixed nominal exchange rates are perfectly equivalent to a unified rate system with taxes on certain external transactions.[16] In this case, as with unified predetermined rates, inconsistent macroeconomic policies will result in loss of international reserves, a rate of domestic inflation that will exceed world inflation, and in real exchange rate overvaluation. This situation, of course, will be unsustainable in the long run and the authorities will have to introduce corrective macropolicies.

A different kind of nonunified nominal exchange rates consists of a fixed official rate for current account transactions and an (official) freely fluctuating rate for capital account transactions. Although this type of arrangement has been more prevalent in the more advanced countries,

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[15] There is a growing theoretical literature on the effects of macroeconomic policies under nonunified nominal rates. See Aizenman (1985), Dornbusch (1986a,b).

[16] See, for example, the discussion in Dornbusch (1986a).

in recent years a number of developing nations (i.e., Mexico, Venezuela) have experimented with it. The main purpose of this system is to delink the real side of the economy from the effects of supposedly highly unstable capital movements.[17] In this dual exchange rate system, portfolio decisions are highly influenced by the differential between the free and fixed rates or exchange rate premium. The private sector decisions on what proportion of wealth to hold in the form of foreign currency denominated assets is highly influenced by the expected rate of devaluation of the free rate.[18]

Under this type of dual exchange rate system, even if no current account transactions slip into the free rate, change in the free nominal rate will exercise an influence on the relative price of tradables or real exchange rate.[19] Consider, for example, the case of an increase of domestic credit at a rate that exceeds the increase in the demand for domestic money. As before this will provoke an excess demand for goods and financial assets. As a result of this policy there will be a decline in the stock of international reserves, an increase in the price of nontradable goods, and consequently a real appreciation. In addition there will be an increase in the demand for foreign assets, which will result in a nominal devaluation of

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[17] In fact, this type of dual rate system is an alternative to exchange rate controls.

[18] The free rate, in turn, will be highly responsive to expectations about future events. This type of regime has been recently discussed by Dornbusch (1986b) in his article in the World Bank Economic Review.

[19] Notice that if no current account transactions are subject to the free rate the relevant RER -- that is the appropriate measure of competitiveness -- is the fixed rate RER. This is because this is the one at which all goods transactions can take place.

the free rate, and in changes in the domestic interest rate.[20] The devaluation of the free rate will, in turn, have secondary effects over the official real exchange rate via a wealth effect. The bottom line, however, is that in this case inconsistent macropolicies will eventually be also unsustainable, as international reserves are drained. By isolating the current from the capital account, all the dual rates system can hope to do is delay the eventual crisis.

The analysis is somewhat more complex if some current account transactions are subject to the free nominal exchange rate. In this case we will have an additional real exchange rate -- defined as the price of tradables subject to the free nominal rate relative to nontradables. In this case macropolicies will affect both real rates.[21] For example, an increase in domestic credit that exceeds growth of domestic money will now result in lower reserves, higher prices on nontradables, a higher "free" market nominal exchange rate, and increased foreign indebtedness. The higher price of non-tradables will generate a decline (i.e., appreciation) in the real exchange rate applicable to those goods subject to the official foreign exchange market. What will happen to the RER relevant to those goods subject to the free nominal rate? This will depend on whether as a result of the higher rate of growth of domestic credit the nominal exchange rate determined in the free market will increase by more or less than the price of non-tradable goods. If the same type of behavior as under a freely

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[20] In this case if there are no capital controls and we assume risk neutrality, the following relation will hold between domestic (i) and foreign interest rates (i*). $i = (e/f)\, i^* + (\dot{f}/f)$ where e is the fixed nominal exchanger rate, f is the free rate and $(\dot{f}/f)$ is the expected change in f.

[21] Dornbusch (1986b) analyzes this case in some detail.

floating rate is observed, we will likely encounter exchange rate overshooting in this market, with the free rate nominal exchange rate increasing -- at least on impact -- by more than the price of domestic goods. The real exchange rate applicable to this type of good will, at least in the short run, depreciate. It is perfectly possible, then, that under this dual exchange rate system an expansionary monetary policy results in a real appreciation for a subset of goods -- those subject to the official market --, and a real depreciation for a different subset of goods -- those subject to the free market for the nominal exchange rate.

Perhaps the most complex type of regime consists of an official pegged (or predetermined) nominal exchange rate that coexists with an illegal black market for foreign exchange. Although when there are exchange controls some kind of black market for foreign exchange always exist, there are times when this parallel market becomes very significant, and even dominant.[22] Although the combination of a fixed official rate with a black market works in a way similar to the dual rates regime discussed above, there are some important differences. First, to the extent that the black market is illegal, the expectations and costs of detection play an important role in determining the premium, or difference between the official and freely determined nominal exchange rates. Second, expectations regarding political events are fundamentally important, since they reflect possible future changes in the extent of exchange controls, and other important policies. Third, in this case exporters have to decide in each period what proportion of their foreign exchange earnings to surrender legally and what proportion

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[22]The extent and importance of the black market is basically determined by whether authorities allow some changes in international reserves. Under complete rationing the authorities have no reserves, and legal export proceeds are the only source of foreign exchange.

to bring into the country via the parallel market.[23] This decision, of course, will partially depend on the level of the premium itself.

An important question in the case of generalized black markets relates to determining what is the marginal exchange rate. Under these circumstances the black market rate will generally be the marginal rate for import and import competing sectors. In the case of exports, the marginal rate will depend on the institutional arrangement and on whether exporters "have" to surrender a certain proportion or a certain dollar amount of their export proceeds, via the official market. If a certain proportion of these proceeds has to be surrendered, the marginal rate for exporters is a weighted average between the official and the black market rate. If on the contrary exporters have to surrender a given number of dollars, the black market rate is the marginal one.

In the case of a generalized illegal parallel market, an increase in the rate of domestic credit creation will result in higher domestic prices and in an increase in the black market premium. Since the Central Bank has already lost all its international reserves, the increase in domestic credit will not be translated, as before, in losses of the official stock of foreign exchange. This expansive monetary policy will result in an appreciation of the official real exchange rate as well as in a decline of the relative price of exports surrendered via the official market relative to those that use the parallel market.[24] As a result of this a relatively smaller proportion of export proceeds will be surrendered at the official

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[23] In a way exporters also face this decision under an official dual system. In that case it will still pay to convert export proceedings at the higher free rate.

[24] Depending on expectations the nominal exchange rate determined in the parallel market can increase by more or by less than domestic prices.

rate, making the crisis even worse. Eventually, the inconsistent macropolicies will become unsustainable, and corrective policies will have to be implemented. At this point the issue of nominal exchange rate unification becomes important, since the authorities will usually try to devalue the nominal rate, and eliminate the (legal or de facto) multiple rates system.

PART II:

DEALING WITH REAL EXCHANGE RATE MISALIGNMENT

V. Two Types of Real Exchange Rate Misalignment

In this and the following sections we analyze several issues related to real exchange rate misalignment, and we discuss alternative ways of dealing with the problem. The analysis focuses on the more common exchange rate systems in the developing nations: predetermined (official) rates, such as unified fixed exchange rates, managed rates and official fixed-cum fluctuating parallel regimes.

Real exchange rate misalignment was defined earlier as a sustained departure of the actual real exchange rate from its equilibrium value. When the actual real exchange rate is below its equilibrium value there is a real exchange rate overvaluation; if on the contrary the actual RER exceeds the ERER there is a real exchange rate undervaluation.

For policy and analytical purposes it is useful to distinguish between two different types of real exchange rate misalignment: The first type, which we call macroeconomic induced misalignment occurs when, due to inconsistencies between the macroeconomic, and especially monetary, policies and the official nominal exchange rate system, the actual RER departs from its equilibrium value.[25] As pointed out in Section IV, when monetary policies become expansive -- either to finance the fiscal deficit, or for other reasons -- and exceed the path compatible with maintaining the predetermined nominal exchange rate, the price of domestic goods will tend to grow at a faster rate than world inflation. As a result, the real exchange rate (EP^*_T/P_N) will experience a decline or real appreciation. In most cases the expansive monetary policies not only generate pressures on

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[25] In a predetermined nominal system this influence of monetary policies is reflected via changes in the price of nontradables; under fluctuating rates it is reflected via changes in both the nominal rate and the price of domestic goods.

P_N, but are also translated on losses of international reserves, increased (net) foreign borrowing above its long run sustainable level, widening gaps between official and parallel markets, and greater coverage of the parallel market.[26]

The second type of misalignment, which we call structural misalignment, takes place when there are changes in the real determinants (or fundamentals) of the equilibrium RER, that are not translated in the short run into actual changes of the RER. This will be the case, for example, when there is a worsening in the country's international terms of trade. As a result of this shock there will be a change in the ERER, since now a higher relative price of tradables will be required to maintain equilibrium in the economy.[27] If this change in the equilibrium RER is not accompanied by a change in the actual RER, a real exchange rate misalignment will take place. An important question regarding structural misalignment is whether the changes in the real determinants in the ERER are perceived as being temporary or permanent. Temporary changes in these variables can sometimes result in significant divergences between the real and an equilibrium real exchange rate (Edwards, 1986). These disequilibria induced by temporary changes in fundamentals -- such as a temporary worsening in the terms of trade -- can many times be handled with specific policies aimed at dealing with short lived shocks. These policies include the running down (or accumulation) of international reserves, the use of the IMF compensatory

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[26] Naturally, as the gap between the official and parallel market widens, so do the distortions associated with these dual rates.

[27] Strictly speaking, as a result of a worsening in the international terms of trade the ERER could either appreciate or depreciate. As discussed in Section III above, under the most plausible circumstances, however, there will be a depreciation of ERER. See Appendix II.

facilities, and so on. Naturally, the main problem with this type of situation is being able to recognize the temporary nature of these shocks.

VI. Real Exchange Rate Misalignment and the Limits of Automatic Adjustment

Real exchange rate misalignments result in severe welfare and efficiency costs, related to trading at disequilibrium prices. Perhaps the most important source of these costs is due to the fact that RER misalignment usually is accompanied by the imposition of a battery of exchange and trade controls aimed at slowing down the drainage of foreign exchange reserves that accompanies the process of RER overvaluation. These exchange and trade controls, on one hand, introduce major inefficiency costs, and on the other, encourage the creation of strong lobbies which compete for the rents generated by the protective measures (see Krueger 1973, Edwards 1987). Also, a situation of exchange rate overvaluation greatly hurts exports, and if prolonged for a long period of time it can generate irreversible costs by wiping out the agricultural infrastructure (see World Bank 1983, Pfefferman 1984). These types of costs can even be significant in situations of short term structural misalignment, if there are imperfections in local capital markets. Situations of RER misalignment are also conducive to speculation, and usually generate massive capital flight out of the country. Although these capital flights may be optimal from a purely private perspective, they can represent substantial social welfare costs (Cuddington 1986).

Since RER misalignment generate major costs, how should policymakers deal with them? In the case of macroeconomic induced misalignment, a necessary step is to eliminate the source of the macroeconomic disequilibrium -- i.e., the inconsistency between macroeconomic policy and the nominal exchange rate. The authorities can then supplement this policy with other

measures or can simply wait for the economy to adjust on its own; that is, wait for the actual RER to converge on its own to the equilibrium RER. However, this type of policy, which we will call disinflation with automatic adjustment has a number of limitations which can be particularly severe under predetermined nominal rates.

Once the inconsistent macroeconomic forces generating the macroeconomic induced real exchange misalignment are controlled, the RER will still differ from the ERER. The question then is how will the RER return to its equilibrium value? Consider the most common case where the real exchange rate misalignment takes the form of real overvaluation and loss of competitiveness in the international market. In this case, and under fixed nominal rates, a rapid return to real exchange rate equilibrium will require a decline of the nominal domestic price of nontradables.[28] A rapid reduction in this nominal price is, under most circumstances quite unlikely, meaning that an automatic adjustment could take a substantial period of time, prolonging the situation of RER misalignment with all its related costs.

Under (nominal) domestic price and wage rate inflexibility the automatic adjustment approach can generate additional costs in the form of unemployment and reduced domestic output. The cut in aggregate expenditure resulting from the macrocorrective measures will generate an excess supply (or smaller excess demand) for all types of goods and assets. At the tradables goods level this will be reflected in a smaller trade deficit, and in a reduction in (net) foreign indebtedness. In the nontradables market, however, the excess supply generated by the disinflation will require a drop

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[28] Since $RER = EP^*_T/P_N$, under fixed E, RER can only jump back to equilibrium if P_N declines.

in the relative price of nontradables to reestablish equilibrium. If nominal prices are rigid, this relative price realignment will not take place, and unemployment will result.

The case of costly automatic adjustment is illustrated in Figure 2 which depicts the well known diagram of a small open economy with tradable and non-tradable goods. The production possibilities frontier is qq, with T referring to tradable goods and N to nontradables. P is the initial production point and C initial consumption. The slopes of the production possibilities frontier at P and of the social indifference curve at C are equal among themselves and equal to the initial relative price of tradables to nontradables or RER. The ray OX, on the other hand, is the income expansion path corresponding to this RER. The initial situation depicted here is assumed to be one of disequilibrium with the excess of tradables consumption (T_C) over tradables production (T_p) being financed via unsustainable (net) foreign borrowing. Moreover, we assume that the force behind this excess of expenditure is an expansionary monetary policy. In this case, then, there is an RER overvaluation with the actual RER being below its equilibrium value.

Assume now that the expansionary monetary policy is halted, and that domestic credit creation is reduced to a point where the excess demand for tradables is completely eliminated. As a consequence of the contractionary domestic credit policy, aggregate expenditure will decline. In terms of the diagram this means that the aggregate expenditure schedule aa will shift downward. If relative prices (i.e., the RER) do not change, expenditure will move along the income expansion path (ray OX) towards the origin. However, with unchanged relative prices, production remains at P on the transformation curve, since this point represents the most efficient

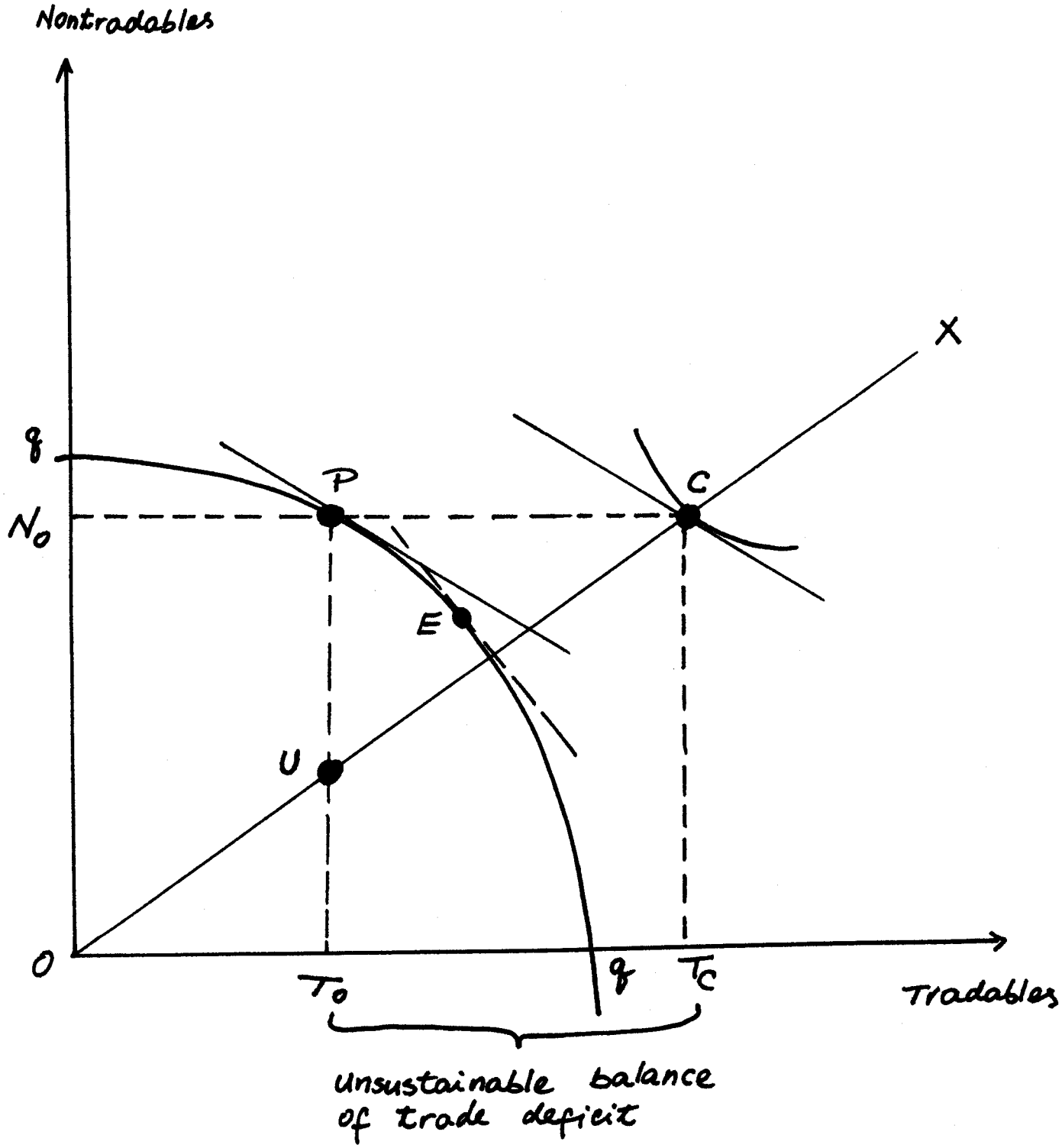

Figure 2: Real Exchange Rate Realignement Under Price Rigidities

allocation of resources for that relative price. It can be clearly seen from the diagram that if expenditure moves down along ray OX , and production stays at P , a situation of <u>excess supply</u> for nontradable goods will ensue. The only way to resolve this excess supply is via a reduction in the relative price of nontradables $[P_N/(EP_T^*)]$. Under predetermined nominal rates, this reduction in nontradables relative prices will require a decline in the <u>nominal</u> price of nontradables. As the price of nontradables goes down, production of tradables increases and production of that type of goods declines. The final equilibrium, in this case, will be characterized by point A with equality between quantities supplied and demanded of tradables and nontradable goods.

What will happen if due to price inflexibility the required decline in P_N fails to occur? In this case the nontradable goods market will have to clear via a reduction in the quantity produced. This type of adjustment will generate unemployment and is characterized in Figure 2 by production and consumption taking place at point U inside the transformation curve. Of course, the fact that the new equilibrium is inside, rather than on the transformation curve clearly illustrates the fact that under price rigidity the disinflation approach to retaining equilibrium will usually result in substantial unemployment costs.

However, the restoration of real exchange rate equilibrium can be greatly aided by policies, such as nominal devaluations, that help the domestic price of tradables to adjust. In terms of the real exchange rate definition, $(RER = P_T/P_N)$, these policies are aimed at generating a higher RER via an increase in P_T $(= EP_T^*)$. This contrasts with the disinflation automatic adjustment approach whose aim is to generate the complete return of the RER to equilibrium via its effect on P_N.

Although nominal devaluations are the most common type of policy used to affect the domestic (relative) price of tradables, they are not the only one. In the next section we discuss a number of alternative policies and compare their main features to outright nominal devaluations.

VII. Real Exchange Rate Realignment, Devaluation and Other Policy Alternatives

As pointed out in the previous section an adjustment policy based on disinflation only -- what we have called the automatic adjustment approach -- can result in nontrivial adjustment and unemployment costs. In theory these costs can be reduced by implementing, along side with the macro-economic corrective measures, policies directly geared towards influencing relative prices. In this section we discuss in general terms the main characteristics of a number of such policies. We start our discussion with an analysis of devaluation. We then look at other policies, including an import tariffs-cum-export subsidies package, and compare their effects to those of a devaluation. In Section VIII, we look in closer detail at the interaction between devaluation and real exchange rate misalignment, and we discuss the historical evidence regarding the effectiveness of devaluations as policies aimed at changing the value of the RER.

VII.1 Devaluation

Nominal devaluations are usually important components of structural adjustment programs -- and especially those sponsored by the IMF and/or the World Bank. In the case of a country with some form of pegged exchange rate, this usually means that the value of the nominal exchange rate is abruptly changed. In principle, the policy objectives of these devaluations are (a) to generate a real devaluation or improvement in the international competitiveness of the country; and (b) to provoke an improvement in its

external position. Whether a devaluation will actually be successful will depend on a number of factors, the most important being the initial conditions and the accompanying macroeconomic policies.[29] Obviously, since RER $= EP_T^*/P_N$ a nominal devaluation that increases E will only be effective in moving the RER towards its higher equilibrium value if P_N does not go up in the same proportion as E.

In theory, and under the most common conditions, nominal devaluations will affect an economy via three main channels.[30] First, a devaluation will have an expenditure reducing effect. To the extent that as a result of the devaluation the domestic price level goes up, there will be a negative wealth effect that will induce the real value of domestic currency denominated nominal assets, including domestic money. Notice, however, that to the extent that there are assets denominated in foreign currency there may also be a positive wealth effect. If the negative wealth effect dominates, there will be a reduction in expenditure on all goods including tradables, and there will be a reduction in the trade deficit. Second, a nominal devaluation will tend to have an expenditure switching effect.[31] To the extent that the nominal devaluation succeeds in altering the relative price of tradables to nontradables there will be a substitution in expenditure away from nontradables, and a substitution in production towards tradables. The combination of these two effects will, of course, result in

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[29] The initial conditions include whether there are distortions stemming from the existence of parallel markets for foreign exchange. See Appendix VIII for a brief review of alternative theories of devaluation.

[30] In some cases, however, if there are extensive quantitative import controls and parallel markets some of this effects will be different. See the discussion below.

[31] We say it will "tend to have" because this assumes that the nominal devaluation is translated into a real devaluation.

an improved external situation for the country. While the expenditure switching effect results in an increased demand for nontradables, the expenditure reducing effect generates a decline in demand for those goods. Depending on which of these effects dominate there will be an increase or a decline for the demand for domestic home goods. Third, a devaluation will result in an increase in the domestic currency price of imported intermediate inputs. This will result in an upward shift of the supply schedules for the final goods including nontradables.[32]

An important characteristic of nominal devaluation is that, under unified nominal exchange rates and with no quantitative restrictions, it is not discriminatory, and increases the domestic price of all tradable goods, services, and assets. This, however, will not be the case if there is a parallel (or dual) market, and the devaluation refers to the official rate only. In this case, only those transactions affected by the official rate will be directly affected by the devaluation. Of course, since the parallel (or free) market will be affected by the devaluation, transactions conducted in that market will be subject to an indirect effect. Notice, however, that in general it is not possible to know a priori whether an official rate devaluation will increase or reduce the parallel market premium. Naturally, with parallel markets there will be additional relative price changes, with the price of transactions subject to the official rate changing relative to those subject to the parallel rate.[33]

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[32]The combination of these effects may very well result in a decline of aggregate output as a consequence of the devaluation. See Edwards, 1986.

[33]Of course, the devaluation itself will affect the parallel rate. Theoretically speaking an official devaluation can generate either an increase or decline in the black market premium. The empirical evidence indicates that following the nominal devaluation there is usually a drop in the parallel market premium. An important question when there are parallel

When there are quantitative restrictions (QRs) on imports, devaluations will also fail to generate a uniform increase in the price of tradables. In fact, in this case nominal devaluations may have quite a different effect than in those circumstances where tariffs are used to restrict imports.[34] In the case of QRs the domestic price of the importable will be endogenous, in the sense that it will take whatever level is required for that market to clear. In this case a nominal devaluation will tend to have no direct (first round) effect on the domestic price of those importables subject to QR rationing. However, since the price of exportables continues to be tied, via the exchange rate, to its world price, the devaluation will increase their price relative to rationed importables. Nonrationed importables will also be affected by the devaluation and their relative price relative both to rationed importables and nontradables will tend to change.

As noted above, from a policy perspective the immediate objective of a nominal devaluation is to reduce or eliminate the existence of real exchange rate misalignment by generating a real devaluation or improvement in the international competitiveness of the country, with the ultimate purpose of producing an improvement in the external position. Whether a nominal devaluation will be successful in accomplishing these objectives will depend on: (a) accompanying policies implemented alongside with the devaluation, and (b) on the initial conditions prevailing prior to the devaluation.

Let us first focus on the initial conditions. If the country implements a devaluation at a time when the real exchange rate is greatly

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markets refers to exchange rate unification. Lizondo (1986) has shown that the equilibrium nominal rate can be either above or below the black market.

[34] See Krueger (1982).

misaligned (i.e., overvalued) the nominal devaluation will generally be helpful to restore equilibrium in the external sector. Under these starting conditions a nominal devaluation, if accompanied by the appropriate macropolicies, will generally have a medium to long run positive effect on the real exchange rate. In practice what the nominal devaluation will do is help the country follow a smoother transition path toward reestablishing equilibrium in the external sector (recall the discussion in Section VI). If the initial condition of real exchange rate misalignment has been generated by unsustainable macroeconomic policies, a discrete once-and-for-all devaluation will only have a lasting effect on the real rate if at the same time as the devaluation the unsustainable policies are corrected.

If, however, the initial condition is one of equilibrium -- that is, the actual real exchange rate does not diverge from its long run equilibrium level -- a nominal devaluation will have no medium or long run effect. Very quickly after the nominal devaluation has been implemented, the price of nontradables, P_N will increase and the real exchange rate will not be affected.

The second set of factors that determine the effectiveness of a real devaluation is the accompanying policies. As stated above, one of the main objectives a nominal devaluation tries to achieve is the elimination of the misalignment via a <u>real</u> depreciation and consequent increase in the degree of competitiveness. It is very important, then, that the nominal devaluation -- which increases E in our real exchange rate formula ($RER = P^*E/P_N$) -- is <u>not</u> accompanied by an equiproportional increase in P_N. Obviously, if this is the case, and E and P_N increase in the same proportion, and the real exchange rate will remain unaffected. There are a number of policies which work towards generating an increase of P_N. The

more obvious ones are expansive credit (or monetary) policies, expensive fiscal policies, and wage indexation policies. Consequently, if a nominal depreciation is accompanied by these types of policies it is not unlikely that the domestic price of nontradables will increase, and the objective of the nominal devaluation will be defeated. If, on the contrary, the nominal devaluation is implemented alongside with demand management policies (i.e., restrained domestic credit and fiscal policies), and in the absence of wage indexation, it is likely that the nominal devaluation will succeed in generating a real devaluation, and will help the real exchange rate return equilibrium in the country in question.

It should be noted, however, that even if the accompanying macro-policies are restrictive, nominal devaluations will never result in equiproportional real devaluations in the medium to longer run. The reason is that there are a number of forces that work towards generating (at least) a partial offsetting increase in the price level P_N. The most obvious of these forces is related to the role of imported intermediate inputs. The nominal devaluation will result in higher domestic prices of imported inputs, and consequently of the cost of producing domestic goods. This effect, that partially offsets the effect of the nominal devaluation will be more important as time passes. That is, it will generally be expected that the effect of the nominal devaluation on the real exchange rate will be partially eroded through time. On impact of the nominal devaluation will result in a high (and almost equiproportional) increase in the real exchange rate. As time passes, the prices of imported goods, and in some cases wages react to the nominal devaluation, the effect on the real exchange rate will be partially eroded. (See Section IX for empirical results regarding the degree of erosion).

VII.2 Are There Alternatives to Devaluations?

Policymakers are many times confronted with the question of whether there are alternatives to outright nominal devaluations. The answer is that, in principle, there are other policies -- or policy packages -- that have some effects on relative prices similar to those of a devaluation. However, it is not easy to fully replicate the effects of devaluations. Moreover, as discussed below, most of these alternative policies are inferior options that, nevertheless may, under some specific conditions be useful. The purpose of this section is to briefly discuss the main properties of the policies some times proposed as an alternative to outright devaluations. In doing so the similarities and differences between the effects of these policies and those of a nominal devaluation are pointed out.

Import Tariffs and Export Subsidies

Many times policymakers are confronted with the question of whether the simultaneous imposition of import tariffs and export subsidies (of the same rate) will replicate the effects of a devaluation. The answer is that the tariffs cum subsidies policy will only replicate some of the effects of a devaluation. Import tariffs will result in an increase in the domestic price of the importable goods; export subsidies will likewise result in an increase of the domestic price of the exportable goods. As long as both the tariffs and the subsidies are of the same rate the relative price between importables and exportables (the tradables) will not be affected, but their relative price with respect to nontradables will increase. In this way, thus, the domestic relative price of tradables as a group will increase, which is indeed what will happen in the case of a successful devaluation. In that respect, then, both policies are equivalent.

There are however a number of other important respects in which these two policies differ quite sharply. First, while a devaluation affects both visible and invisible trade, (i.e., trade on goods and services), the tariff cum subsidies policy affects only visible trade. Consequently the relative price between goods and international traded services is altered in the case of the tariffs cum subsidies policy, but not in the case of a devaluation. Second, a devaluation affects the domestic currency price of both tradable goods and tradable assets. A tariff cum subsidies policy, on the other hand, affects only the domestic price of tradable goods and services. Third, under some circumstances devaluations may affect the level of the domestic interest rate. This will happen as long as a devaluation generates expectations of further devaluations. In this case, as pointed out in Edwards (1986), some fraction of the expected devaluation will be passed on to the domestic interest rate, even if the capital account of the economy in question is partially closed. On the other hand the tariffs cum subsidies policy will not have this type of effect on the domestic interest rate. Fourth, devaluations and tariffs cum subsidies policies will usually have different fiscal effects. While, in general, devaluations will not have direct effects on the fiscal budget, the tariffs cum subsidies policy will generally result in fiscal imbalances. Finally (fifth), perhaps the most important differences between the devaluation and tariff cum subsidies policies are related to the political economy of these two strategies. Generally, the imposition of tariffs and export subsidies will generate important reactions from the affected interest groups which will seek an exemption to the application of this measure to their particular industry. As the history of many cases has shown more often than not these interest groups partially succeed in getting exemption changes applied to their

products. The argument used by the interest groups lobbyists are well known -- the good in question is a necessity, or vital to the geopolitical survival of the country.

Multiple Nominal Exchange Rates

The adoption of dual (or multiple) exchange rates is another alternative to outright devaluations which is sometimes discussed by policymakers. In reality, of course, the adoption of multiple rates constitute a semi-devaluation, in as much as the exchange rate applied to some transactions only is altered. Obviously, by their own nature multiple rates are different than devaluations. Multiple rates practices are essentially discriminatory, while one of the most important properties of a devaluation (without rationing) is its neutrality; namely it affects all tradable goods in the same way.

There can be many types of multiple rates, and in fact historically at one time or another countries have had up to 15 or 20 different exchange rates! As discussed in Section IV, there are basically two types of multiple rate arrangements that have been particularly common. The first is multiple exchange rates for commercial transactions, where different exchange rates are applied to different tradable goods. The most common case is one where exports (or a subset of exports) have a different rate than the rest of tradables. This type of arrangement works like an import tariff in the sense that it introduces a wedge between the relative price of importables and (hence) exportables. Of course, this system shares all the characteristics of a tariff system including the welfare inefficiency costs.

As noted earlier, another common multiple exchange rate practice is the dual rates system, where a different rate is applied to commercial transactions and to capital account transactions. Again, and by definition, the

imposition of this system is different from an outright devaluation, in the sense that it discriminates between goods and assets. In order to evaluate whether this system will work one has to assess if the links between commercial and financial transactions are indeed cut off, or if some mechanisms linking these two accounts still remain. The most important characteristics of the dual rate system is that, although in some cases it may be useful to separate the real side from the effects of financial disturbances, it is not really an appropriate substitute for a devaluation in cases of acute exchange rate misalignment. Furthermore, once a dual -- or multiple -- rates system is chosen at some point in the future the important question of how (and at what level) to unify the different rates will have to be addressed.

Disinflation, Once Again

Another alternative to a devaluation is to implement a traditional stabilization program without affecting the nominal exchange rate. This is what we earlier called the automatic adjustment approach (see Section IV). Clearly, given the definition of the real exchange rate, in order for this type of program to result in a realignment of the exchange rate the nominal price of domestic good has to fall relative to that of foreign goods. In principle, at least, this can be achieved through the implementation of a disinflation which ultimately will reduce the domestic goods nominal prices. Of course, as mentioned earlier, this can indeed be quite costly in terms of unemployment and output.

Incomes Policies

Finally we will briefly discuss the implementation of incomes policies as an alternative to a devaluation. Again, this approach would succeed in

realigning the real rate only if the price of domestic goods goes down, relative to that of foreign goods. In that regard the accumulated historical evidence is quite emphatic: incomes policies not supplemented with demand management measures have invariably failed to bring down inflation. Trying to realign the real exchange rate using income policies only is not only an inefficient approach, but also a very risky one.

VIII. The Effectiveness of Devaluations: The Historical Evidence

The existing empirical evidence strongly suggests that if supplemented by appropriate macroeconomic policies nominal devaluations can be quite successful in generating a real depreciation and an improvement in the external position of the country. For example, in his classical study, Cooper (1971), analyzed 24 episodes, finding that in most cases nominal devaluations were indeed associated with real devaluations. He also pointed out that in most instances major discreet devaluations had been accompanied by some sort of trade reforms, where quantitative restrictions were lifted, and tariffs were lowered. This finding has also been reported by Krueger (1978) and Edwards (1987).

Conolly and Taylor (1976, 1979) conducted a comprehensive study on the effects of devaluation on the external sector, and found that nominal devaluations were translated into relative price changes, or real devaluations, in the short- to medium-run. For example, the evidence presented in their 1979 paper suggests that on impact nominal devaluations have an important effect on relative prices; however, this positive effect erodes slowly, until 9 quarters after the devaluation the real exchange rate is back to the value it had 2 years before the devaluation.

Other studies by Donovan (1979), Bautista (1982) and Morgan and Davis

(1982), for example, also indicate that nominal devaluations have an initial positive effect on relative prices; through time, however, the effect on the real exchange rate begins to erode. The findings in these studies differ, however, in terms of the speed and the extent of this erosion.

More recently Edwards (1986) analyzed in detail 29 devaluation episodes between 1962 and 1979, and found that in a number of countries nominal devaluation had been quite successful in the sense of being able to generate an important increase in the level of the real exchange rate. In Table 1 we present data on an index of effectiveness of real devaluations for these 29 episodes. This index is constructed as the ratio of the percentage change of the real exchange rate to the percentage change of the nominal exchange rate. This table clearly reflects the large effect that devaluations have on impact. They also show the erosion of this effect in the next 12 quarters. Notice that in some cases after this period the degree of erosion is more than complete; the real exchange rate becomes even more overvalued than prior to the nominal exchange rate adjustment -- see the cases of Argentina, Bolivia 1979, Cyprus, Egypt 1962, Israel 1971, Jamaica 1967, Nicaragua 1979. Usually in this case the authorities are forced to further devalue some time down the road. In a word, then, while some devaluations have historically been "successful" others have been terribly unsuccessful, leaving after only 3 years, the RER below its predevaluation level. In Edwards (1986c) it is shown that the countries that have a high (or complete) erosion of the effect of the nominal devaluation in a period of four years, are those that accompany the exchange rate adjustment with expansive domestic credit policies, large fiscal deficits, and or had wage rate indexation schemes in effect. On the other hand, those countries that experienced a small degree of erosion usually implemented consistent

TABLE 1

Index of Effectiveness of Nominal Devaluation

	Year of Dev.	Quarter of Devaluation	1 Qtr. After	4 Qtrs. After	8 Qtrs. After	12 Qtrs. After
Argentina	1970					
Bolivia	1972	0.68	0.66	0.36	0.09	0.03
Bolivia	1979	0.51	<0	<0	<0	*
Colombia	1962	0.94	0.48	<0	<0	*
Colombia	1965	1.00	0.88	0.50[a]	0.57*	0.66*
Costa Rica	1974	0.82	1.04	0.75	0.75	0.83
Cyprus	1967	1.00	0.19	0.27	0.31	0.32
Ecuador	1961	1.05	1.06	0.93	0.51	0.03
Ecuador	1970	0.88	0.74	0.73	0.59	0.66
Egypt	1962	1.03	1.03	0.98	0.85	0.32
Egypt	1979	0.99	1.05	0.98	0.93	0.76
Guyana	1967	1.03	0.96[a]	1.10[a]	1.31[a]	1.42[a]
India	1966	0.92	0.81	0.56	0.56	0.62
Indonesia	1978	1.00	0.98[a]	0.73[a]	0.64[a]	0.61[a]
Israel	1962	0.94	0.87	0.74	0.63	0.53
Israel	1967	0.95	0.93	0.99	1.05	0.57
Israel	1971	0.98	0.64	0.53	0.23	<0
Jamaica	1967	0.96	0.99	0.83	0.57	0.37
Jamaica	1978	0.46	0.43	0.31	0.26	0.20
Malta	1967	0.93	0.88	0.99	1.12	0.99
Nicaragua	1979	0.17	<0	<0	<0	<0
Pakistan	1972	1.00	0.99	0.78	0.61	0.45
Peru	1967	0.89	0.65	0.40	0.41	0.36
Philippines	1962	0.97	0.89	0.87	0.73	0.69
Philippines	1970	0.72	0.65	0.49	0.47	0.55
Sri Lanka	1967	0.82	0.71	0.54	0.70	0.69
Trinidad	1967	0.82	0.71	0.54	0.70	0.69
Venezuela	1964	0.98	0.95	0.96	1.00	1.02
Yugoslavia	1965	0.67	0.46	0.42	0.29	0.26

Notes: This index is constructed as the percentage change in the real exchange rate between one quarter before the devaluation and the quarter of the devaluation, one, four, eight and twelve quarters after the devaluation divided by the percentage change in the nominal exchange rate during the same quarter.

demand management policies, consisting of refrained creation of domestic credit, and greatly reduced (relative to the one-devaluation time period) fiscal deficits.

In order to fully evaluate the effects of nominal devaluations on the real exchange rate, maintaining other things constant, regression equations were estimated using the cross country data set for the 29 devaluation episodes in Table 29.[35] In these regressions the dependent variable was defined as the percentage change in the real exchange rate between the year prior to the devaluation and k years after the devaluation (for $k = 1,2,3$ years). The following four independent variables were (jointly) considered: (a) the percentage change of the nominal official exchange rate during the same period; (b) the change in the rate of growth of domestic credit in year k relative to the year prior to the devaluation; (c) the change in the ratio of the fiscal deficit to GNP for 1, 2 and 3 years after the devaluation; and (d) an interactive term that tries to capture the magnitude of the initial "disequilibrium" of the real exchange rate prior to the devaluation. These regressions equation were run for three years: the year immediately after the devaluation, two years after the devaluation, and three years after the devaluation. Consequently, in these regressions the coefficient of the nominal exchange rate term should be interpreted as a measure of effectiveness of the nominal devaluation, maintaining other things constant. The results obtained indicate that on average, and maintaining all other things given, a 10% nominal devaluation will result, in the first year, on a real devaluation of approximately 7%. The real effect of the nominal devaluation, however, erodes (rather slowly) through time. After three

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[35] See Edwards (1986a), and Appendix VI for more detailed information.

years the average effect on the real exchange rate of a 10% nominal devaluation will be only around 5% (with all other things given).

Perhaps the most interesting result obtained from these regressions relates to the coefficient of the rate of change of domestic credit. It was, in all cases, significantly negative, showing that if an exchange rate change is accompanied by expansive domestic credit policies the corrective effect of the nominal devaluation on the real exchange rate will be greatly diminished. More interesting than the sign, however, are the magnitudes of these coefficients. In the first year it is -0.519, indicating that if a 10% nominal devaluation is accompanied with an expansive macro policy consisting of an acceleration of the rate of growth of domestic credit equal to 10 percentage points, the resulting real depreciation will be reduced to approximately 2% in that year. As time passes the offsetting effect of the expansive domestic credit policy grows in fairly dramatic fashion. For example, after two years, the case just discussed will result in a more than full offset of the nominal devaluation. In this case after two years we will actually observe a <u>real appreciation</u> and a return to overvaluation. Of course, in this case the reason for the appreciation is not the nominal devaluation, but of the expansive credit policy. The results from the regression using three years after the devaluation show that the offsetting effect of the expansionary credit policy keeps increasing in the third year after the devaluation.

BIBLIOGRAPHY

Aizenman, J., "Tariff Liberalization Policy and Financial Restrictions," Journal of International Economics, 19 (1985): 241-255.

Balassa, B., Development Strategies in Semi-Industrial Economics, Oxford University Press, 1978.

_____, "Reforming the System of Incentives in Developing Economies," in B. Balassa (ed.), Development Strategies in Semi-Industrial Economies, Oxford University Press, 1982.

Barro, R.J., "Real Determinants of the Real Exchange Rates," unpublished paper, November 1983.

Brecher, R., "Minimum Wages and the Pure Theory of International Trade," Quarterly Journal of Economics (1974).

Calvo, G., "Fractured Liberalism," Economic Development and Cultural Change (Apr. 1986).

Corbo, V., "Chilean Economic Policy and International Economic Relations Since 1970," in G.M. Walton (ed.), The National Economic Policies of Chile, Greenwich CT: JAI Press, 1985.

_____ and J. de Melo, "What Went Wrong in the Southern Cone" in S. Edwards and S. Teitel (Eds.), Growth, Trade and Debt in Latin America, special issue of Economic Development and Cultural Change (April 1986).

Corden, W.M., The Theory of Protection, Oxford University Press, 1971.

_____, "The Exchange Rate, Monetary Policy and North Sea Oil," Oxford Economic Papers (1981): 23-46.

_____, "Exchange Rate Protection," in R.N. Cooper et al. (eds.), The International Monetary System Under Flexible Exchange Rates, Ballinger, 1981.

_____, "Booming Sector and Dutch Disease Economics: A Survey," Oxford Economic Papers (1984).

_____, and J.P. Neary, "Booming Sector and De-Industrialization in a Small Open Economy," Economic Journal (1982): 825-48.

Cooper, R., "Exchange Rate Devaluation in Developing Countries," Princeton Essays on International Finance (1971).

Diaz-Alejandro, C., Exchange Rate Devaluation in a Semi-Industrialized Economy: Argentina 1955-1961, MIT Press, 1986.

_____, "Southern Cone Stabilization Plans," in W.R. Cline and S. Weintraub (eds.), Economic Stabilization in Developing Countries, Brookings, 1981.

_____, "Comment on Harberger," in S. Edwards and L. Ahamed (eds), Economic Adjustment and Exchange Rate in Developing Countries, University of Chicago Press, 1986.

Dixit, A., and V. Norman, Theory of International Trade, Cambridge University Press 1986.

Dornbusch, R., "Tariffs and Nontraded Goods," Journal of International Economics (May 1974): 117-85.

_____, "The Theory of Flexible Exchange Regimes and Macroeconomic Policy," Scandinavian Journal of Economics, 78 (May 1976): 255-75.

_____, Open Economy Macroeconomics, New York: Basic Books, 1980.

_____, "Remarks on the Southern Cone," IMF Staff Papers, (Mar. 1983).

_____, "Panel Discussion on Opening of the Economy," (undated).

_____, "Special Exchange Rates for Capital Account Transactions," World Bank Economic Review (September 1986).

_____, "Special Exchange Rates for Commercial Transactions," in S. Edwards and L. Ahamed (Eds.), Economic Adjustment and Exchange Tastes in Developing Countries (U. of Chicago Press 1986).

Edwards, S., "The Order of Liberalization of the External Sector," Princeton Essays on International Finance, N156, 1984.

_____, "Stabilization and Liberalization: An Evaluation of the Years of Chile's Experiment with Free Market Policies, 1973-1983," Economic Development and Cultural Change, January 1985a.

_____, "Money, the Rate of Devaluation and Interest Rates in a Semi-Open Economy," Journal of Money, Credit and Banking (February 1985).

_____, "Are Devaluations Contractionary?", Review of Economics and Statistics (August 1986b).

_____, "Exchange Rate Misalignment in Developing Countries: Analytical Issues and Empirical Evidence" CPO Working Paper, The World Bank, 1986c.

_____, "Economic Liberalization and the Real Exchange Rate in Developing Countries," paper presented at the Carlos-Diaz-Alejandro Memorial Conference, Helsinki, August 1986d.

_____"Tariffs, Terms of Trade and Real Exchange Rates in Intertemporal Models of the Current Account," Working Paper, Dept. of Economics, UCLA 1986.

_____, Real Exchange Rates, Devaluation and Adjustment, forthcoming, MIT Press.

_____, and A. Cox Edwards, Monetarism and Liberalization: The Chilean Experiment, Ballinger, 1987.

_____, and S. van Wijnbergen, "The Welfare Effects of Trade and Capital Market Liberalization," International Economic Review (Feb. 1986).

Frankel, J., K. Froot, and A. Mizala-Salas, "Credibility, the Optimal Speed of Trade Liberalization, Real Interest Rates, and the Latin American Debt," Working Paper, Berkeley, 1985.

Hanson, J., and J. de Melo, "External Shocks, Financial Reform and Liberalization Attempts in Uruguay," World Development, 1985.

Harberger, A., "The Dutch Disease: How Much Sickness and How Much Boom?" Resources and Energy (1983).

_____, "Economic Adjustment and the Real Exchange Rate," in S. Edwards and L. Ahamed (eds.), Economic Adjustment and Exchange Rates in Developing Countries, University of Chicago Press, 1986a.

_____, "A Primer on the Chilean Economy," in A. Choksi and D. Papageorgious Economic Liberalization in Developing Countries, Oxford: Blackwell 1986b).

Johnson, H.G., "A Model of Protection and the Exchange Rate," Review of Economic Studies (Apr. 1966).

Jones, R., "The Structure of Simple Macroeconomic Models," Journal of Political Economy (1965).

_____, "A Three Factor Model in Theory, Trade and History," in J. Bhagwati (ed.), Trade, Balance of Payments Growth, Amsterdam: North-Holland Publishing Co., 1971.

_____, "Trade with Many Commodities," Australian Economic Papers (1974).

Khan, M., and R. Zahler, "The Macroeconomic Effects of Changes in Barriers to Trade and Capital Flows: A Simulation Analysis," IMF Staff Papers, June 1983.

_____ and J.S. Lizondo, "Devaluation, Fiscal Deficits and the Real Exchange Rate," The World Bank Economic Review (January 1987).

_____, "Trade and Financial Liberalization in the Context of External Shocks and Inconsistent Domestic Policies," IMF Staff Papers, March 1985.

Krueger, A.O., Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences, Cambridge, MA: 1978.

_____, Exchange Rate Determination (Cambridge U. Press, 1982).

Lizondo, J.S., "Exchange Rate Reunification," paper presented at Econometric Society Meetings, Cordoba, Argentina 1986.

McKinnon, R.I., Money and Capital in Economic Development, Washington: Brookings Institution, 1973.

Michaely, M., "The Sequencing of a Liberalization Policy: A Preliminary Statement of Issues," unpublished ms., 1982.

Neary, J.P., "Short-Run Capital Specificity and the Pure Theory of International Trade," Economic Journal, 88 (1978): 448-510.

_____, "International Factor Mobility, Minimum Wage Rates, and Factor Price Equalization: A Synthesis," Quarterly Journal of Economics (1985).

_____, and S. van Wijnbergen, "Can an Oil Discovery Lead to a Recession? A Comment on Eastwood and Venables," Economic Journal, 94 (1982): 390-95.

Razin, A., and L.E.O. Svenson, "Trade Taxes and the Current Account," Economics Letters, (1983).

Svensson, L.E.O., and A. Razin, "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect," Journal of Political Economy (1983).

van Wijnbergen, S., "The Dutch Disease: A Disease After All?" Economic Journal (Mar. 1984).

_____, "Taxation of International Capital Flows," Oxford Economic Papers (1985).

_____, "Capital Controls and the Real Exchange Rate," CPD WP #1985-52, World Bank 1985.

_____, "Tariffs, Employment and the Current Account," International Economic Review, forthcoming.

Williamson, J., The Exchange Rate System (Institute of International Economics, Washington D.C. 1983).