

INTRODUCTION TO
REAL EXCHANGE RATES, DEVALUATION AND ADJUSTMENT*

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UCLA Working Paper Number 507
September 1988

*This is a draft of Chapter 1 of S. Edwards's Real Exchange Rates, Devaluation and Adjustment, (forthcoming, The MIT Press 1989).

ABSTRACT

This paper corresponds to Chapter 1 of the forthcoming book Real Exchange Rates, Devaluation and Adjustment: Exchange Rate Policy in Developing Countries. This work investigates several aspects related to exchange rates in developing nations. Theoretical models of equilibrium and disequilibrium exchange rates are developed; the behavior of real exchange rates is investigated for a large cross section of countries; and the effectiveness of devaluation is assessed for a group of 39 developing nations.

D1: September 1985
D2: May 1987
D3: June 1987
D4: November 1987
Final Draft: July 1988

C H A P T E R 1

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CHAPTER 1

Introduction

Exchange rate problems have become a dominant theme in policy discussions in the developing countries. Some analysts have argued that many of the economic misfortunes suffered by the LDCs during the 1980s -- including the debt crisis (Cline, 1983), the disappointing outcome of the Southern Cone experiments with free market policies (Corbo, et al. 1986), and the dismal performance of Africa's agricultural sector (World Bank, 1984) -- have been the result, in one way or another, of inappropriate exchange rate policies. Two main issues regarding exchange rates have in particular attracted the attention of policymakers and academics. First, there has been increased interest in trying to understand real exchange rate fluctuations; and second, there has been mounting concern regarding the effectiveness of nominal devaluations as policy tools.¹

In the last 15 years or so real exchange rates (RERs) have become increasingly volatile in the developed as well as in the developing countries. This has been true even for those developing countries that after the collapse of the Bretton Woods system maintained a fixed nominal exchange rate regime. In some countries the fluctuations in real exchange rates have been so pronounced that it is not at all surprising to find that the domestic real price of some tradable goods increases by two or three times in a matter of a few years. In fact, the Argentinian case of 1981, when a glass of Coca Cola in the Buenos Aires Sheraton cost approximately U.S. \$7 has become legendary.

Table 1.1 contains the ratio of highest to lowest real multilateral exchange rates in a group of LDCs for the periods 1965-1971 and 1972-1984.

TABLE 1.1
 Ratio of Highest to Lowest Real Exchange Rate
 In Selected Developing Countries:
 1965-1971 and 1972-1984

<u>Country</u>	<u>1965-71</u>	<u>1972-84</u>
Bolivia	1.3	2.6
Dominican Republic	1.1	2.9
El Salvador	1.2	2.5
Kenya	1.1	1.3
Korea	1.1	1.4
Paraguay	1.6	2.3
Sri Lanka	1.3	3.9
Yugoslavia	3.2	1.5
Zambia	1.3	2.7

Source: These ratios refer to multilateral RER indexes constructed using data on official nominal exchange rates. See Chapter 4 for a detailed discussion on how they have been constructed.

As can be seen in all but one of these countries this ratio was higher for the second period. The indexes in Table 1.1 were constructed using official nominal exchange rates. If, however, data on parallel markets for foreign exchange are used these ratios are even larger.²

It is now well accepted at the theoretical level that excess volatility in RERs, and in particular situations of real exchange rate misalignment will be translated into important welfare costs. Maintaining the RER at the "wrong" level generates incorrect signals and greatly hurts the degree of competitiveness of the tradables sectors (Willet 1986). Determining whether a country's RER is at a particular point in time out of line with its long run equilibrium level is, both theoretically and practically, one of the most difficult challenges faced by macroeconomic analysts and policymakers both under predetermined and floating nominal exchange rates. The difficulties, however, don't finish there. In a predetermined nominal exchange rates regime, once it is established that the RER is indeed misaligned policy packages aimed at correcting this disequilibrium should be devised. Among the traditional policy measures to face exchange rate misalignment and external sector disequilibria devaluation is one of the most important.

Historically, devaluations have generally been traumatic episodes in the developing countries. They have often been surrounded by political upheaval, and as a consequence of them finance ministers and even governments have many times fallen.³ Even in the late 1980s, more than fifteen years after the abandonment of the generalized fixed parities Bretton Woods system, devaluations continue to be a "touchy" subject in the developing nations. It is very common to find that even when facing major external disequilibria, these countries' authorities vehemently resist devaluing their currencies. Why have devaluations been so strongly opposed in so many

countries, while at the same time they have been so single-mindedly pushed by the international multilateral institutions such as the World Bank and the International Monetary Fund? What is the historical record of devaluations in the developing nations? Why do they seem to work in some countries and not in others? What is, after all, the precise role of a devaluation from a theoretical perspective? These questions are not only of relevance to academics but also to policymakers. Obtaining answers to them will allow us to better understand one of the most controversial policy issues in the developing world.

The purpose of the present book is to tackle a number of policy questions related to equilibrium and disequilibrium real exchange rates, and to investigate empirically the extent to which devaluations have been successful (or unsuccessful) in the developing nations. The main hypotheses of this study can be summarized in a few lines: First, it is argued that contrary to some popular policy views not all observed movements in RERs -- not even large movements -- necessarily represent a disequilibrium situation.⁴ The long run equilibrium RER is a function of a number of real variables, and observed changes in RERs may well be an equilibrium phenomenon. Second, even though the equilibrium RER depends on real variables only, the actual RER responds to real and monetary variables. Unsustainable or inconsistent macroeconomic policies will, under most circumstances, generate large deviations between actual and equilibrium RERs, or real exchange rate misalignment. Determining whether observed RER measurements in a particular country and period of time are justified by structural changes, or if they primarily respond to macroeconomic instability is an empirical matter. Third, if the starting situation is one of disequilibrium, and if accompanied by appropriate macroeconomic policies, nominal devaluations can

greatly help an economy to regain equilibrium in a rapid and efficient way. Whether a stepwise devaluation or a devaluation followed by a crawling peg is more effective will depend on a number of factors, including the country's ability to sustain fiscal discipline. The main theoretical underpinnings of these hypotheses are provided in Chapters 2 and 3. Chapters 4 through 8 present an extensive cross-country empirical analysis that deals, among other things, with (a) real exchange rate measurement; (b) actual real exchange rate behavior; (c) real exchange rates and parallel (black) market premia; (d) measures of equilibrium RER movements; (e) consequences of RER volatility; (f) causes of devaluation crises; (g) exchange controls and balance of payments crises; (h) macroeconomic consistency and black markets for foreign exchange; (i) nominal and real devaluations; (j) devaluations and capital flight; (k) devaluations and real output; and (l) devaluations, real wages and income distribution.

Although this book emphasizes exchange rate issues in the developing countries, many of the points made here are broader and apply as well to the industrialized nations. In particular, much of the theoretical discussion in Chapters 2 and 3 is applicable to any small open economy. The empirical analysis, however, deals exclusively with developing nations, ranging from newly industrialized countries (NICs) to some of the poorest nations.

There are a number of reasons that justify separating developing from developed nations when analyzing exchange rate issues. First, after the collapse of the Bretton Woods System the vast majority of the developing countries maintained some type of predetermined (i.e., fixed or crawling peg) nominal exchange rate regime.⁵ In that regard, most of the theoretical advances experienced by the economics of exchange rates during the 1970s and 1980s -- which have primarily dealt with an array of issues pertinent to

freely fluctuating exchange rates -- have had limited applicability for the developing countries. Second, most developing country's currencies are non-convertible; exchange controls are quite pervasive, greatly reducing the degree of capital mobility. Third, in only a handful of LDCs there are futures markets for foreign exchange, making exchange risk a major source of uncertainty for producers, exporters and consumers. Fourth, multiple official exchange rates are also a common feature, imposing de facto taxes on a number of transactions. Fifth, in many countries parallel or black markets for foreign exchange are quite common, and at times even dominant. And sixth, in many of these countries, and in particular in Africa, domestic capital markets are highly repressed. This results in a reduced capacity for engaging in traditional monetary and fiscal policies. Although these institutional differences between the developed and developing nations are important, there are many other aspects common to both types of countries. In fact, as is argued in Chapter 2, the more fundamental principles surrounding long run equilibrium real exchange rates in the two groups can be analyzed using a very similar theoretical apparatus. Finally, it is important to notice that there are also differences across developing countries. Some of the Newly Industrialized Countries (NICs) have institutions that are much more sophisticated than those in the poorer nations.

1.1 Preliminary Concepts

Alternative Definitions of Real Exchange Rates

Until now we have used the term exchange rate in a rather vague way. This, in fact, reflects the state of affairs in the international economics literature, where a number of alternative definitions of real exchange rates are currently used. While this is not per se serious, it does generate some

communication problems. Moreover, some economists from outside the field of international economics have objected altogether to the use of the concept of "real" exchange rates on the grounds that it involves a contradiction of terms. According to this view the (nominal) exchange rate is by definition a monetary variable; how, then, can we talk about a "real" exchange rate?⁶ Although these professionals may have a (small) point, the term real exchange rate is too engrained in the modern literature on international and development economics as to attempt here to rename it. What is very important, however, is to have a clear idea of what we exactly mean by "the" real exchange rate.

In most modern theoretical works "the" real exchange rate (e) is defined as the domestic relative price of tradable goods (P_T) to non-tradable goods (P_N): $e = P_T/P_N$.⁷ This definition summarizes incentives that guide resource allocation across the tradables and nontradables sectors; an increase in e will make the production of tradables relatively more profitable, inducing resources to move out of the nontradables sector and into the tradables sector. In addition, this definition of the real exchange rate provides a good index of the degree of international competitiveness of the country's tradables sector. Indeed, this relative price 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.⁸ Although there are other indexes of a country's international degree of competitiveness such as unit labor costs, these alternative indexes are usually unreliable in the case of the developing countries.⁹

A more traditional, but still popular, definition of the real exchange rate relies in the Purchasing Power Parity (PPP) approach. According to the supporters of this view, the PPP real exchange rate (e_{PPP}) is equal to the nominal exchange rate (E) corrected (i.e. multiplied) by the ratio of "the" foreign price level (P^*) to "the" domestic price level: $e_{PPP} = EP^*/P$. Depending on whether P and P^* are consumer price indexes or producers price indexes, e_{PPP} will be the relative price of foreign to domestic consumption or production baskets. Although this definition of real exchange rates has not been popular in academic writing for quite sometime now, it is still widely used by policy makers and other practitioners. This is partially explained by the difficulties encountered in measuring the relative price of tradables to nontradables.

It is interesting to compare the tradables-nontradables relative price definition with the PPP definition of the real exchange rate. Assuming that P and P^* in the PPP definition are geometrically weighted averages of tradable and nontradable prices, with weights, α , $(1-\alpha)$, β and $(1-\beta)$, it is possible to write $P = P_N^\alpha P_T^{1-\alpha}$ and $P^* = P_N^*{}^\beta P_T^*{}^{(1-\beta)}$. Further assuming that the country in question is small, that the law of one price holds for tradable goods (i.e., $P_T = P_T^*E$), that there are no taxes on trade, and that E is fixed and equal to 1, it is possible to find the relation between percentage changes in the real exchange rate (e) and in the PPP real exchange rate, where, as usual, the "hat" operator ($\hat{}$) represents

percentage change: $\hat{e} = (1/\alpha)\hat{e}_{PPP} + (\beta/\alpha)(\hat{P}_T^* - \hat{P}_N^*)$. It may be seen, then, that in general changes in the two definitions of the real exchange rate will differ (i.e., $\hat{e} \neq \hat{e}_{PPP}$). Moreover, e and e_{PPP} can even move in opposite directions, depending on the behavior of foreign relative prices (P_T^*/P_N^*).

Although the PPP real exchange rate (e_{PPP}) is also an index of the degree of international competitiveness of the country in question, it fails to capture changes in the relative incentives guiding resource allocation across the tradables and nontradables sectors. Consequently, e_{PPP} does not provide precise information on how relative prices impinge on the evolution of the external sector and of the different accounts of the balance of payments. For this reason, in the theoretical chapters of this book the real exchange rate is defined as the relative price of tradables to nontradables. In Chapter 4 we discuss some of the problems encountered in the attempt to measure this relative price, and propose some proxies for it.

The above discussion on the tradables to nontradables definition of the real exchange rate has ignored taxes on international trade. However, if there are these type of taxes a decision should be made on whether to define a real exchange rate inclusive or exclusive of them. To the extent that we are interested in the allocation of resources between tradables and nontradables, the domestic relative price of tradables should be used. This is indeed the approach followed by most modern theoretical works. However, a limitation of this definition, is that it (implicitly) assumes that all tradable goods are subject to the same tax. However, in a many goods economy the different tradable goods are subject to taxes at different rates. For example, most importables are subject to differentiated tariffs or import quotas, while some exportables are many times subject to taxes.

Two basic ways have been devised for handling this problem. First, some authors have proposed to define sector-specific (or good-specific) indexes of the real exchange rate corrected by the effects of taxes (or subsidies).¹⁰ For example, if sector j is subject to a tax of t_j this index will be $e_{Tj} = EP_j^*(1+t_j)/P_N$. A serious limitation of this approach is that it defeats the whole idea of having one comprehensive measure of competitiveness for the economy as a whole. The second way of handling the existence of differential trade taxes is by defining the economy wide real exchange rate index exclusive of these taxes. In this case, then, $e = EP_T^*/P_N$. This approach has a number of advantages. First, this theoretical definition is quite close to available empirical measures, and second once this index of the economy wide RER is available, it is still possible to use information on the sectoral taxes on trade to compute more detailed relative price indexes.

Real Exchange Rate Measurement

When faced with the practical decision of constructing time series of real exchange rate indexes for the developing countries analysts are confronted with significantly fewer options than those suggested by more theoretical discussions. In fact, the construction of actual indexes is surrounded by a number of problems, ranging from finding proxies for the analytical constructs to deciding which price indexes to use, and so on. Given the particularly severe data constraint encountered in the majority of the developing countries, measured RER indexes invariably take the following form:

$$RER = \frac{E P^*}{P}$$

where E is either the bilateral or the effective (i.e., multilateral) nominal exchange rate, P^* is some foreign price index and P is a

domestic price index. A problem with this measure refers to choosing price indexes -- or components of price indexes -- that are good proxies for the price of tradables and of nontradables. Some authors, for example, have suggested using the domestic consumer price index as a proxy for nontradable prices, and a foreign wholesale (or producer) price index as a proxy for the world price of tradables (Harberger 1986). In a number of LDCs where there are multiple rates or generalized black markets, an additional problem consists on choosing E. To the extent that the analyst requires periodicity and reliability the choices of P^* and P are limited to CPIs and WPIs (or its components). In Chapter 4 we discuss a number of important issues of real exchange rate measurement and we analyze the behavior of different indexes of real exchange rates.

Real Exchange Rate Misalignment

Real exchange rate misalignment is a term commonly used in policy discussions, but seldom defined in a precise way. In this study real exchange rate misalignment is defined as sustained deviations of the actual real exchange rate from its long run equilibrium level. If the actual real exchange rate is below the equilibrium RER value we say that there is a real exchange rate overvaluation. If, on the other hand, the actual RER exceeds the equilibrium RER we say that there is an undervaluation.

It follows immediately from this definition of misalignment that as a first step in understanding this phenomenon we need to have a theory on how the equilibrium real exchange rate behaves. Traditional policy analyses have tended to follow the Purchasing Power Parity (PPP) doctrine of equilibrium real exchange rates. According to this theory the equilibrium real exchange rate is constant; its equilibrium level is found by looking at the value of the RER in some distant period that exhibited external

equilibrium (see Dornbusch 1986c). The approach taken in this book differs significantly from the PPP view. The equilibrium real exchange rate (ERER) is defined as that relative price of tradables to nontradables that, for given sustainable (equilibrium) values of other relevant variables such as taxes, international prices and technology, results in the simultaneous attainment of internal and external equilibrium. Internal equilibrium means that the nontradable goods market clears in the current period, and is expected to be in equilibrium in future periods. In this definition of equilibrium RER it is implicit the idea that this equilibrium takes place with unemployment at the "natural" level. External equilibrium, on the other hand, is attained when the intertemporal budget constraint that states that the discounted sum of a country's current account has to be equal to zero, is satisfied. In other words, external equilibrium means that the current account balances (current and future) are compatible with long run sustainable capital flows.

From our definition of real exchange rate misalignment it also follows that in addition to understanding how equilibrium RERs behave, we need to have a theory on how the actual RER behaves, and on why the actual RER can indeed differ from its equilibrium value. This is done in Chapter 3 where a monetary model of a small open economy with a parallel market for foreign exchange is developed.

1.2 Plan of the Book

The book is divided in three parts. Part 1, comprised by Chapters 2 and 3, deals with the theory of equilibrium and disequilibrium real exchange rates. Part 2 -- Chapters 4 and 5 -- present the results from a large cross-country empirical analysis on real exchange rate behavior in

developing countries. Part 3 -- Chapters 6 through 8 -- deal with devaluation and real exchange rate realignment.

The theoretical analysis is concentrated on Chapters 2 and 3. In Chapter 2 an intertemporal optimizing real model of a small open economy is developed to analyze the process of determination of equilibrium real exchange rates. The model considers the case of a two period economy where three goods -- exportables, importables and nontradables -- are consumed and produced. The equilibrium RER is defined as the relative price of nontradables compatible with the simultaneous attainment of external and internal equilibrium. Throughout the chapter we analyze in great detail how the equilibrium real exchange rate responds to a number of real disturbances including terms of trade shocks, import tariff reforms, changes in government behavior, and technological progress.

The purpose of Chapter 2 is to analyze the way in which the equilibrium real exchange rate responds to disturbances. Chapter 3, on the other hand, deals with actual real exchange rate behavior. In this chapter a monetary model of a small economy with a dual nominal exchange rate regime is developed. It is shown that unsustainable and inconsistent macroeconomic policies will generally lead to real exchange rate overvaluation, losses of international reserves and balance of payments crises. The model is used to analyze the role of devaluations in the adjustment process, including issues related to exchange rate crises.

Chapters 4 and 5 present empirical cross-country evidence on real exchange rate behavior. In Chapter 4 data for 33 countries are analyzed. The chapter starts by discussing problems related to RER measurement, and comparing different RER indexes for the 33 countries in the sample. Then, it deals with parallel markets nominal rates and real exchange rates

behavior. Finally, the time series properties of three alternative RER indexes for the 33 countries are analyzed. One of the main findings of the chapter is that there is massive evidence rejecting the PPP theory of real exchange rate behavior.

In Chapter 5 we investigate empirically the roles played by nominal and real factors in real exchange rate movements for a group of 12 developing countries. For this purpose we derive a very general equation for RER dynamics that is able to capture the most important features of the theoretical constructs of Chapters 2 and 3. The econometric results reported in this chapter support the hypothesis that real exchange rate movements respond, at least in the short run, to both monetary and real disturbances. These econometric estimates are then used to construct series on equilibrium real exchange rates for a number of countries. These estimated equilibrium RERs exhibit, for some of the countries, significant changes, as our model from Chapter 2 suggested.

Chapters 6 through 8 deal with devaluation and real exchange rate realignment. In them 39 major devaluation episodes during 1960-1982 are analyzed in detail. Chapter 6 deals with the causes of devaluation at the light of the model developed in Chapter 3. In particular, we inquire as to the extent to which historically devaluations have been the result of inconsistently expansive macroeconomic policies. In this empirical analysis we use a variety of statistical methods both parametric and nonparametric. In addition to macroeconomic policies we analyze the behavior of parallel markets for foreign exchange, as well as of exchange controls, trade impediments and payments restrictions. To a large -- even surprising -- extent the results from this analysis support the implications of our model from Chapter 3.

Chapter 7 deals with the effects of nominal devaluations, concentrating on whether they have been able to generate real exchange rate devaluations and, thus, help reestablish real exchange rate equilibrium. Here we make a clear distinction between stepwise devaluations and those devaluations followed by the adoption of a crawling peg. The analysis undertaken in this chapter closely follows the evolution of parallel market rates during the aftermath of the devaluation. Also, we look in detail at the interaction between devaluations and attempts to liberalize the external sector in these countries. In this chapter an effort is made to distinguish between successful and unsuccessful devaluations, and the causes behind the successes and failures are investigated.

The analysis in Chapter 7 concentrates exclusively on the effects of devaluations on the external sector -- the real exchange rate, the current account, capital movements and the accumulation of foreign assets. In Chapter 8 we move away from the external sector and inquire into the effects of devaluations on output, wages and income distribution. The chapter starts developing a model that captures the interactions between devaluations, employment, wages and real economic activity. We then move to an empirical analysis focusing on two data sets: the 39 devaluation episodes of Chapter 6 and 7, and the 12 countries of the regression analysis of Chapter 5. This analysis looks into whether devaluations exhibit contractionary effects on output. The regression analysis also investigates the effects of external sector distortions on economic performance. The chapter finishes with an empirical analysis of the income distribution effects of devaluations. The book closes with Chapter 9, where the main conclusions are presented.

Footnotes to Chapter 1

¹The preoccupation with real exchange rate behavior has not been limited to the developing countries. Trying to explain real exchange rate movements in the industrialized world has indeed been a dominant subject in recent debates. See, for example, Williamson (1983) and Marston (1988).

²See Chapter 4.

³See Cooper (1971b). See also Doone (1986).

⁴These views have been based on the Purchasing Power Parity (PPP) doctrine. See Chapters 2 and 3.

⁵In June 1988 the International Monetary Fund classified the developing nations' exchange regimes as follows: 88 had a pegged nominal exchange rate; 4 countries had "limited flexibility;" 4 adjusted their parity according to a set of indicators; 21 had a managed floating system; and only 10 had an independently floating system. (International Financial Statistics, July 1988).

⁶Naturally these objections carry over to concepts such as the real quantity of money, which economists have used for many years.

⁷See, for example, Dornbusch (1980), Frenkel and Mussa (1984) and the papers in Frenkel (1983).

⁸See Chapter 4. See also Edwards (1988).

⁹Recently, there has been some debate on whether the real exchange rate should be defined as the P_T/P_N or as P_N/P_T . The International Monetary Fund has adopted the latter definition, while the tradition in the developing countries -- and especially in Latin America -- has been to use the former definition. Both approaches have pros and cons. The IMF definition is appealing because in that case a real appreciation is reflected by a

increase in the RER index, while a decline represents a real depreciation. The P_T/P_N definition is particularly appealing because in this case both nominal and real depreciations (appreciations) will result in increases (decreases) of the respective indexes. In this book we will follow the Latin American tradition by defining the real exchange rate as the relative price of tradable to nontradable goods.

¹⁰See for example Krueger (1978). Sometimes this real exchange rate index that incorporates subsidies and taxes has been called the real effective exchange rate. This is another instance of confusing terminology, since other analysts -- and most notably the International Monetary Fund -- do use real effective exchange rates as those real rates computed relative to a basket of currencies. In this study, and in order to avoid confusion we call the basket rate real multilateral exchange rate.