

IMF Working Paper

Trade Liberalization and Real Exchange Rate Movement

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European I Department

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Abstract

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Although theory suggests that the real exchange rate should depreciate after a credible trade liberalization but could appreciate temporarily with a noncredible one, little empirical evidence exists. Unlike existing studies that use either indirect tests or unreliable openness measures, this paper uses an event study based on carefully documented trade liberalization in 45 countries. The result shows that real exchange rates depreciate after countries open their economies to trade. In countries with multiple liberalization episodes, however, real exchange rates appreciate during early episodes, suggesting that partial or noncredible trade liberalizations are associated with real appreciation.

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I. INTRODUCTION

Since the 1980s, governments in many developing countries have undergone a dramatic change in their development strategies, abandoning statist philosophies in favor of market-based approaches. By the late 1990s, most countries of the world had become a part of the global economy. In the process of introducing market forces into their economies, many countries liberalized foreign trade, loosened control of the capital market, and privatized national industries. The record number of cases of trade liberalization provide an excellent testing ground for examining the effects of trade liberalization on the real exchange rate. In addition, while many early trade liberalizations were partial or partially reversed, liberalizations in the late 1980s and 1990s were broader and more sustained. This also provides data for comparing the impacts of partial and temporary liberalizations with more permanent ones.

It is widely accepted that misalignment of the real exchange rate can cause large welfare losses. Maintaining the real exchange rate at an "incorrect" level sends a false signal to the market and leads to misallocation of resources and a loss of competitiveness of the tradable sectors (Willett, 1986). In addition, overvaluation of the exchange rate is considered to be one of the leading causes of exchange rate crises. Studies of factors that systematically affect the real exchange rate can provide a basis for policymakers to gauge the extent of currency misalignment and to design policy responses.

The equilibrium real exchange rate, which is consistent with both internal and external balances, changes in response to real shocks. One such shock is trade liberalization. When a small country liberalizes its trade, demand for importables increases and demand for nontradables decreases in response to the relative price change. Assuming the Marshall-Lerner condition holds, a real depreciation is necessary to maintain internal and external balances (Edwards, 1989). Calvo and Drazen (1998), however, show that trade liberalization of uncertain duration could lead to an upward jump in consumption (including of nontradables through within-period optimization) and, hence, real appreciation.

The theoretical impact of trade liberalization on the real exchange rate movement has been well examined; however, little empirical evidence exists. Existing studies either use imprecise measurements of trade restrictiveness (or openness) or test the impact indirectly. Pritchett (1991) shows that many of these indices are poorly correlated, and no evidence indicates that one measure is better than another.

Unlike existing studies, this paper uses an event study based on carefully documented trade liberalization events in 45 countries to examine the impact of trade liberalization on real exchange rate movements. Two key findings emerge from the study. First, controlling for factors such as deviation of the real exchange rate from its long-run equilibrium, relative GDP growth, terms of trade, the share of government expenditure in GDP, and net capital inflows, the real exchange rate depreciates after a country's most recent episode of trade liberalization. Second, in countries with multiple liberalization episodes, however, the real exchange rate appreciates during early episodes, suggesting that partial or noncredible trade liberalizations are associated with real appreciation.

II. THEORY

Models have been developed to analyze the impact of a trade liberalization on the real exchange rate. Dornbusch (1974) developed a model which showed that an increase in tariffs will lead to real appreciation if nontradables are substitutes, a reasonable assumption at this level of aggregation. A variety of theoretical models have been developed to analyze movement of the equilibrium real exchange rate in response to its fundamental determinants, including trade liberalization. For example, Edwards (1989) developed an inter-temporal model of the equilibrium real exchange rate and showed that a permanent increase in tariffs will lead to real appreciation assuming substitution everywhere and that the substitution effect dominates the income effect. Khan and Ostry (1992) developed a model in which an economy consumes nontradables and importables and produces nontradables and exportables. Assuming all goods are normal and the income effect of a tariff reduction does not dominate the substitution effect of relative price changes, the real exchange rate depreciates. Calvo and Drazen (1998), however, show that trade liberalization of uncertain duration could lead to an upward jump in consumption, and, therefore, a short-run real appreciation.

The following section first presents a model examining the response of the real exchange rate to trade liberalization and then discusses other factors that affect the real exchange rate.

A. Response of Real Exchange Rate to Trade Liberalization

As a benchmark, a model based on Dornbusch (1974) is presented to examine the response of the equilibrium real exchange rate to a permanent trade liberalization. The model serves to clarify terms and provide a guide for the empirical analysis. The implication of a noncredible trade liberalization is briefly discussed.

Assume the home country consumes and produces three goods: exportables, importables, and nontraded goods. The country is small so that the world relative price of tradables (world terms of trade), P^* , is given. In addition, income equals expenditures, the tariff revenues are redistributed back to the consumers in a lump-sum fashion, and no initial distortion exists. Let N be the excess demand for nontradables; I be income; measured in nontradables, P_m and P_e be the domestic relative prices of importables and exportables relative to nontradable, respectively; and t be the tariff rate. All prices are converted into a common currency. In equilibrium the excess demand for nontradables is zero:

$$N(P_m, P_e, I) = 0. \quad (1)$$

Domestic relative prices of tradables are determined by the world terms of trade and tariffs:

$$T = (1 + t).$$

Therefore,

$$P_m/P_e = P^*T. \quad (2)$$

It can be shown that equilibrium in the nontraded goods market implies trade balance. Define θ_m

and θ_e as the compensated excess demand elasticities of nontradables with respect to the relative prices of importables and exportables, respectively. Totally differentiating equation (1), and noting that the redistribution of tariff proceeds implies that a small change in tariff creates no income effect, we have:

$$\theta_m \hat{P}_m + \theta_e \hat{P}_e = 0. \quad (3)$$

Holding the world terms of trade constant and log differentiating Equation (2) yield:

$$\hat{P}_m - \hat{P}_e = \hat{T} + \hat{P}^*. \quad (4)$$

Solving equations (3) and (4) gives:

$$\hat{P}_e = -\frac{\theta_m}{\theta_m + \theta_e} \hat{T}, \quad (5)$$

and

$$\hat{P}_m = \frac{\theta_e}{\theta_m + \theta_e} \hat{T}. \quad (6)$$

In the case where nontradables are substitutes for both traded goods and the cross-price elasticity of excess demand for nontradables θ_m and θ_e is positive, equations (5) and (6) indicate that a reduction in tariffs will lead to a decrease in the relative prices of importables in terms of nontradables and an increase in the relative price of exportables in terms of nontradables. This means that the domestic price of both nontradables and importables decreases vis-a-vis exportables, which is given by the world price. Thus, the domestic price level unambiguously decreases relative to the world price level and the real exchange rate depreciates.

To show this more formally, define P_n as the price level of nontradables, Q as the domestic price index, then:

$$Q = (P_m * P_n)^\alpha (P_e * P_n)^\beta (P_n)^{(1-\alpha-\beta)} = P_m^\alpha P_e^\beta P_n, \quad (7)$$

where α and β are the share of importables and exportables in total consumption.

Let Q_t be the price index of world tradable prices and assume taste is the same across countries:

$$\begin{aligned} Q_t &= (P^* P_e P_n)^{\frac{\alpha}{\alpha+\beta}} (P_e P_n)^{\frac{\beta}{\alpha+\beta}} \\ &= P^* \frac{\alpha}{\alpha+\beta} P_e P_n. \end{aligned}$$

Define the real exchange rate (RER) as the ratio of world tradable price level to domestic prices measured in common currency, that is, $RER = Q_t/Q$. An increase in RER indicates a

real depreciation, and:

$$\begin{aligned} R\hat{E}R &= -\alpha\hat{P}_m + (1 - \beta)\hat{P}_e \\ &= -\frac{\alpha\theta_e + (1 - \beta)\theta_m}{\theta_m + \theta_e}\hat{T}. \end{aligned}$$

Therefore, when nontradables are substitutes for both traded goods, a reduction in tariffs will lead to an increase in $REER$ and an equilibrium real depreciation.

Noting $\theta_e + \theta_m > 0$ because $\theta_e + \theta_m$ is the negative of the own price elasticity of excess demand for home goods, we can show that in response to a reduction in tariffs the prices of both tradables decline relative to non-tradables when nontradables and importables are complements. The relative change in domestic price level, however, is ambiguous. Similarly, when nontradables and exportables are complements, a tariff reduction will lead to a price decrease in nontradables against both tradables, and domestic price level decreases vis-a-vis world price level.

At this level of aggregation, it is reasonable to assume that nontradables are substitutes for both tradables. Therefore, the real exchange rate should depreciate in response to trade liberalization.

The preceding analysis applies to permanent trade liberalizations. A noncredible reform, however, could lead to a real appreciation in the short-run. This is because noncredible trade liberalizations cause individuals to increase consumption while reform last in anticipation of higher prices when the trade liberalization policy is reversed (Calvo and Drazen 1998), including higher demand for nontradables. Consequently, the price of nontradables rises. This implies a decline in the relative prices of exportables P_e and importables P_m , holding the world prices of tradables constant. Equation (8) shows that the real exchange rate appreciates.

B. Other Factors Pertaining to Real Exchange Rate

The real exchange rate is also affected by other factors, including productivity growth, terms of trade changes, government consumption of nontradable goods, and inflows of capital. The expected effects of these factors are briefly outlined below.

- *Productivity Growth.* The Harrod-Samuelson-Balassa hypothesis states that the real exchange rate appreciates in countries experiencing rapid growth. This is because productivity improvement is more rapid in countries with higher growth rates than those with lower ones. In addition, technological progress is biased toward the tradable sector, leading to a rise in the economy-wide real wage, and, hence, an increase in the price of nontradables relative to tradables.
- *Terms of Trade.* Exogenous movements of the terms of trade, relative world prices of exportables to importables, affect the real exchange movement through both income and substitution effects (Edwards, 1989). A decline in the terms of trade causes a reduction in

real income, and, therefore, a fall in demand and the relative price for nontradables. However, the substitution effect of a terms of trade worsening is less straightforward. Again, assuming nontradables and tradables are substitutes, a terms of trade worsening will cause the nontrade price to decline relative to importables but rise relative to exportables, leaving ambiguous the change in the relative price of the nontradables to the tradable as a whole. If we assume that the income effect dominates, we would expect a real depreciation in response to a terms of trade worsening.

- *Share of Government Expenditure.* Changes in the level of government expenditure will also affect real exchange rate movement. Because government spending is composed of mainly nontradable goods, an increase in government expenditure will lead to a rise in demand for nontradables. This is the substitution effect. However, the increase in government spending has to be financed through higher taxes (either current or future), leading to a decline of disposable income and a fall in demand for nontradables. This is the income effect. In the most plausible case, the substitution effect will dominate, and the real exchange rate appreciates (Edwards, 1989).
- *Capital Flow.* In the last decade or so, the world has also witnessed unprecedented capital market opening in developing countries (Henry, 1997a). Concurrent with this opening is a large flow of capital to developing economies. An inflow of capital increases the demand for nontradable goods in the recipient country and thus leads to real appreciation.

The discussion above shows that when testing the response of the real exchange rate to trade liberalization, it is important to control for the effects of productivity growth, terms of trade shocks, changes in government spending, and capital flows.

III. RELATED LITERATURE

This section first provides a brief and selective review of related literature on the response of the real exchange rate to trade liberalization, and then, discusses various measurements of the openness of trade regimes to establish the case for using an event study.

While the theoretical effect of trade liberalization on the real exchange rate has been well examined, the empirical evidence is relatively scant and limited in scope. Using parallel market spreads of exchange rates as an index of the severity of trade restrictions and exchange controls, Edwards (1989) showed that restriction of trade causes appreciation of the real exchange rates, based on experiences in 12 developing countries during 1962–1984. As will be discussed shortly, the parallel market spread is an inaccurate measure of the restrictiveness of trade policy. Using existing estimates of income elasticity of import demand, price elasticity of import demand, and price elasticity of export supply in developing countries, Khan and Ostry (1992) showed that the equilibrium real exchange rate depreciates in response to a tariff reduction. Elbadawi (1994) used trade intensity (ratio of exports plus imports to GDP) to proximate openness, and found that openness has no significant impacts on the real exchange rate. As also will be discussed shortly, trade intensity is not an ideal measure of the openness of a trade regime. In one of the most

extensive studies on trade liberalization, Michaely, Papageorgiou and Choksi (1991) examined movement of the real exchange rate during episodes of trade liberalization. They plotted the real exchange rate during the episodes of trade liberalization and found that there is no consistent pattern of the real exchange rate movement. Their studies, however, failed to control for other factors that may also affect the real exchange rate.

A major challenge of testing empirically the response of the real exchange rate to trade liberalizations is how to measure the multi-dimensional trade restrictiveness. Various measures have been used as a proxy for trade policy stance. These measures can be classified into two broad categories: outcome- and incidence-based measures (Baldwin, 1989). The former infers the restrictiveness of a trade regime by examining the variables affected by trade barriers (prices and trade flows). The latter measures the tariff level or counts the occurrences of nontariff restrictions across sectors.

Within outcome-based measures, there are two subcategories: flow-based measures and price-based measures. Flow-based measures include trade intensity (the ratio of exports plus imports to GDP), structure-adjusted trade intensity (the ratio of trade to GDP adjusted for factors affecting trade including location, external transport cost, country size, etc). Leamer's intervention indices (Leamer, 1988) (deviation of trade from the predicted trade, based on Heckscher-Ohlin models), and import penetration ratio. Price-based measures include implicit tariff rates (differences between domestic prices and border prices of similar products) and the spread of the black market premium of exchange rates (Andriamananjara and Nash 1997, Pritchett 1991). All the trade flow-based measures are sensitive to assumptions and the construction of a counterfactual scenario of what would have happened without the trade barriers. The implicit tariff is preferable to the flow-based measures because it reflects both tariff and nontariff restrictions. However, these measures are difficult to construct and are limited by data availability. The spread of the black market premium of exchange rates is a good proxy for exchange control. However, the premium is affected not only by excess demand for imports but also by demand for foreign assets. In addition, it cannot capture the trade restriction caused by tariffs and nontariff measures.

Incidence-based measures include average tariff rates and non-tariff restriction indices (Andriamananjara and Nash 1997, Pritchett 1991). The average tariff can be measured either as a simple or weighted (production or imports weighted) statutory tariff rate. Because the effect of tariff restrictions depends on the collection rate, which is affected by exemptions and smuggling, average legal rates may not reflect the restrictiveness of the tariff system. An alternative measure of the average tariff rate is the ratio of tariff revenue to imports. This, however, may mask the "escalation" embedded in the rate structure resulting from the high rates on competing imports and low rates on inputs. For this reason, the average legal tariff rate, especially a production-weighted average legal tariff rate, is the preferred measure. One common shortcoming of all tariff-based measures is that they do not reflect the effect of nontariff trade barriers, which could make tariffs redundant for some products. For this reason, measures on the prevalence of nontariff barriers (NTBs) are developed, usually calculated as the share of products subject to NTBs, which include restrictive licensing, quotas, prohibition, finance restriction (advanced import deposit, foreign exchange controls, and prohibitions), price control, and import channel

controls (for example, state monopoly) (Erzan, Hiroaki, Kuwahara, Marchese and Vossenaar, 1989). Because the restrictiveness on trade of various NTBs differs and their impacts vary across products and countries, it is not a reliable measure. In addition to the weakness of incidence-based measures, data on legal tariff rates and NTBs are difficult to obtain, and no continuous time series data exist; this precludes the use of this type of measures for capturing the change in trade policy regimes.

Because of the problems associated with both outcome-based and incidence-based measures, commonly used measures of trade openness are poorly correlated. Using cross-country data, Pritchett (1991) examined the relationships between trade intensity, structure-adjusted trade intensity, import penetration ratio, Leamer's intervention indices, mean tariff, NTB coverage ratio, and price distortion index (the office exchange rate divided by the PPP exchange rate). He found that they are nearly unrelated. This raises concern as to whether any of these measures accurately reflect the openness of a trade regime.

IV. DATA

At the center of this project is the compilation of trade liberalization data and measures of the real exchange rate, which are discussed in the following section.

A. Trade Liberalization

In general, trade liberalization refers to government policy changes that will reduce the distortion on trade flows caused by government intervention. Two types of policy changes are included: (1) price instruments, such as tariff, duty, surcharges, and tax; and (2) non-tariff restrictions, such as quota, prohibition, license, import deposit, etc.

The trade liberalization events are organized by episodes, starting on the date when tariffs, non-tariff, or both restrictions affecting a wide range of sectors were significantly reduced until no apparent changes or, in some cases, a reversal. Since the response of the real exchange rate to trade liberalization is an equilibrium move which requires some time to materialize, the frequency is measured by year rather than month. The trade liberalization dates are from Papageorgiou, Michaely and Choksi (1991), various editions of *Trends in Developing Economies (TIDE)*, various issues of *Economist Intelligence Unit*, various studies on trade liberalizations, country studies, and publications by GATT and WTO (Appendix I).

B. Real Exchange Rate

There are two broad types of real exchange rate indices: multilateral real exchange rate and bilateral real exchange rate. Within each type, the index may vary by the price indices used. Because there is no general agreement on what constitutes the best empirical measurement of the

Table 1: Correlations Between Real Exchange Rate Indices

	MLRERC	MLRER	BIRERC	BIRER
MLRERC	1.0000			
MLRER	0.9860	1.0000		
BIRERC	0.9274	0.9600	1.0000	
BIRER	0.9569	0.9567	0.9743	1.0000

real exchange rate, four sets of real exchange rate indices that are often used in empirical work are compiled.

In compiling these indices, official nominal exchange rates and consumer price indices (CPIs), as a proxy for domestic price levels, are used. The variation among these indices comes from the selection of partner countries and the price indices used for partner countries. These four indices are: multilateral real exchange rate with wholesale price indices (WPIs) as the major partner countries' price indices (MLRERC), multilateral real exchange rate with CPIs as the major partner countries' price indices (MLRER), bilateral real exchange rate with respect to U.S. using CPI as U.S. price index (BIRERC), and bilateral real exchange rate with respect to U.S using WPI as price index. See Appendix II for technical details.

The four indices each have their own strength. As illustrated by the model, when a country liberalizes trade, its domestic price, a composite of tradables and nontradables, should decrease vis-a-vis the world tradable price. This suggests that the CPI, which contains both tradable and non-tradable prices, is a reasonable proxy for the domestic price level. It is difficult, however, to find an empirical counterpart to the tradable price index. The WPI, which contains mainly tradable goods, is a preferable proxy for the tradable price index than the CPI. This means that theoretically BIRER is preferable to BIRERC as a bilateral real exchange rate index. However, BIRERC is the most popular real exchange rate index in policy analyses for wide availability of CPI data and easy computation compared with a multilateral rate (Edwards 1989). In addition, the variation across countries in the components of WPIs makes MLRER less consistent than MLRERC. In general, because bilateral exchange rates do not reflect fully a country's price level relative to its major trading partners, it is less preferable than multilateral real exchange rates.

As shown in Table 1, all of these four indices are highly correlated. The correlation between two multilateral and between two bilateral exchange rates is higher than the correlation between multilateral and bilateral real exchange rates. This confirms the finding by Edwards (1989) that within a particular class of indices (multilateral or bilateral), the choice of the price index in constructing the real exchange rate is less important than the choice between these two classes.

V. RESULTS

This section first examines the movement of the real exchange rate before and after trade liberalization. Using panel data and controlling for other factors, the relationship between the movement of the real exchange rate and trade liberalization is analyzed.

A. Real Exchange Rate After Trade Liberalization

This section examines how the real exchange rate moves after trade liberalization without controlling for other factors and presents statistical patterns in data. The result show that the real exchange rate depreciated significantly after trade liberalizations.

A comparison of the real exchange rate one year after the trade liberalization episode with one year prior to the liberalization shows that most countries experienced real depreciation by all four indices (Figure 1), ranging from 20 to 40 percent. The mean percentage changes vary from 27 to 47 and are all highly significantly (Table 2).

Table 2: Summary Statistics of Percentage Change in the Real Exchange Rate

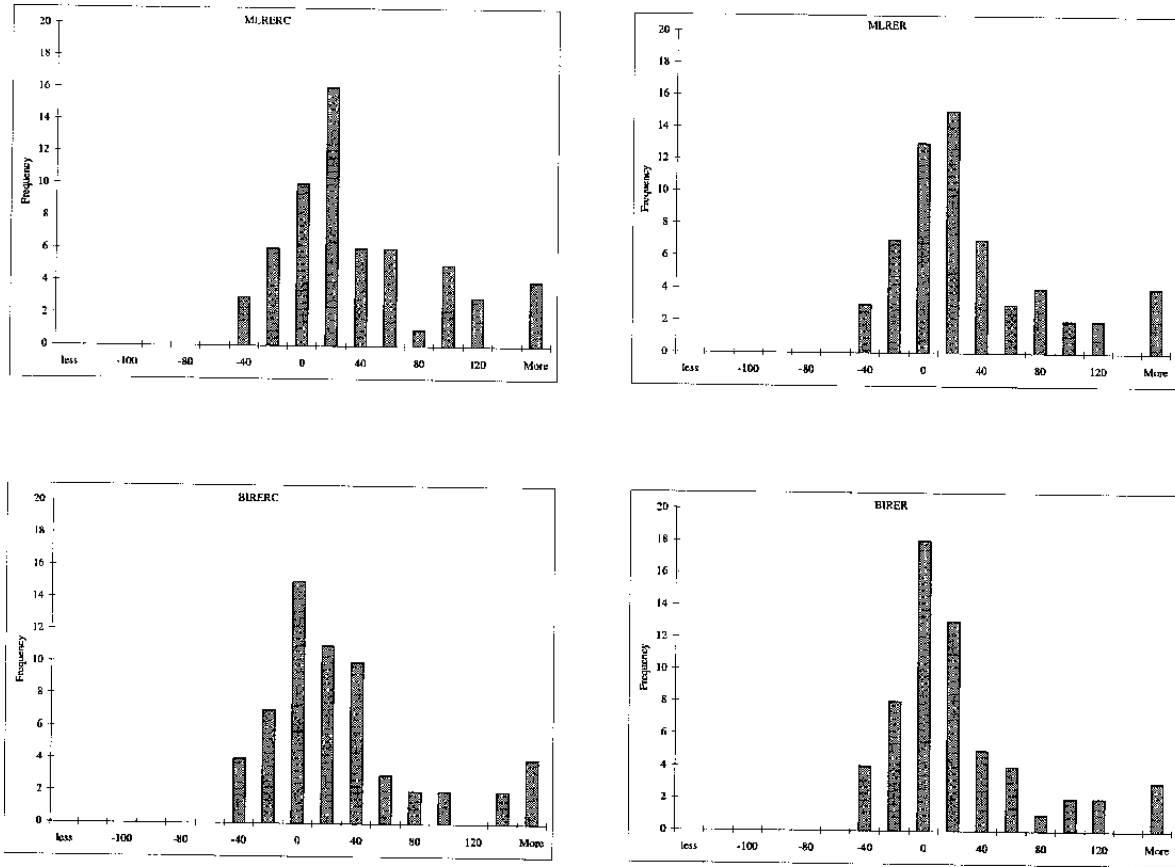
	MLRERC	MLRER	BIRERC	BIRER
Mean	47.64	38.92	36.12	27.17
Standard Error	17.64	16.44	16.43	15.17
Standard Deviation	136.68	127.32	127.27	117.50
Minimum	-48.11	-51.77	-52.21	-55.89
Maximum	936.55	855.18	866.63	792.13
Observations	60	60	60	60
Hypothesized Mean	0	0	0	0
Degree of Freedom	59	59	59	59
t Stat	2.70	2.37	2.20	1.79
P(T<=t) one-tail	0.00	0.01	0.02	0.04

Note: The changes measure the average real exchange rate one year after against one year before trade liberalizations.

To see the dynamics of the real exchange rate around the time of trade liberalizations, the real exchange rate four years before and seven years after the initiation of the reform are plotted in Figure 2. Based on MLRERC, the majority of countries experienced continuous depreciation after the start of trade liberalizations. Prior to the liberalizations, most countries were experiencing real depreciation. The pattern exhibits little variation when the other three indices are used.

To see clearly how the real exchange rate moves on average around the time of trade liberalizations, the cross-section average of the four indices are plotted in Figure B. It shows that on average the real exchange rate was depreciating before the start of trade liberalization and depreciated even more after the initiation of trade liberalization, independent of the indices used. In addition, the real exchange rate appears to depreciate more rapidly at the start of the

Figure 1: Distribution of Percentage Change in the Real Exchange Rate One Year After Trade Liberalization Compared with One Year Before



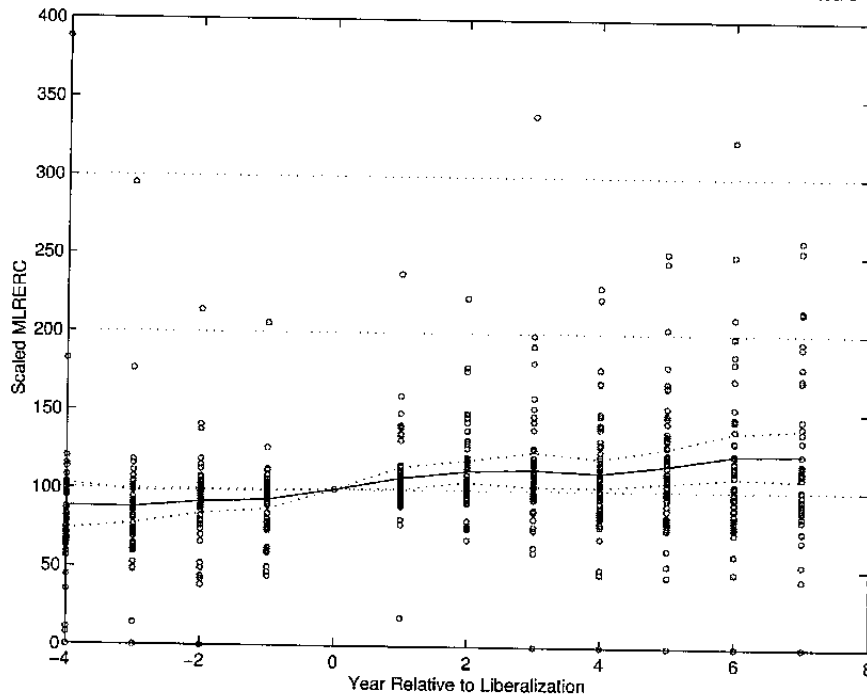
liberalization as indicated by steeper slopes. However, BIRER exhibits a much milder pattern of real depreciation, confirming the finding of Edwards (1989) that it is important to use a multilateral real exchange rate to analyze real exchange rate movement.

In sum, a simplistic examination of the data provides preliminary evidence that the real exchange rate tends to depreciate after trade liberalization, as predicted by theory. On average the real exchange rate depreciates by 27 percent to 48 percent one year after trade liberalization compared with one year prior to the reform. In addition, most trade liberalizations took place when the real exchange rate was depreciating. The following section examines the movement of the real exchange rate after controlling for other factors.

B. Econometric Evidence

This section first presents the specifications of the econometric model and then discusses the results.

Figure 2: Annual Real Exchange Rates Before and After the Initiation of Trade Liberalization

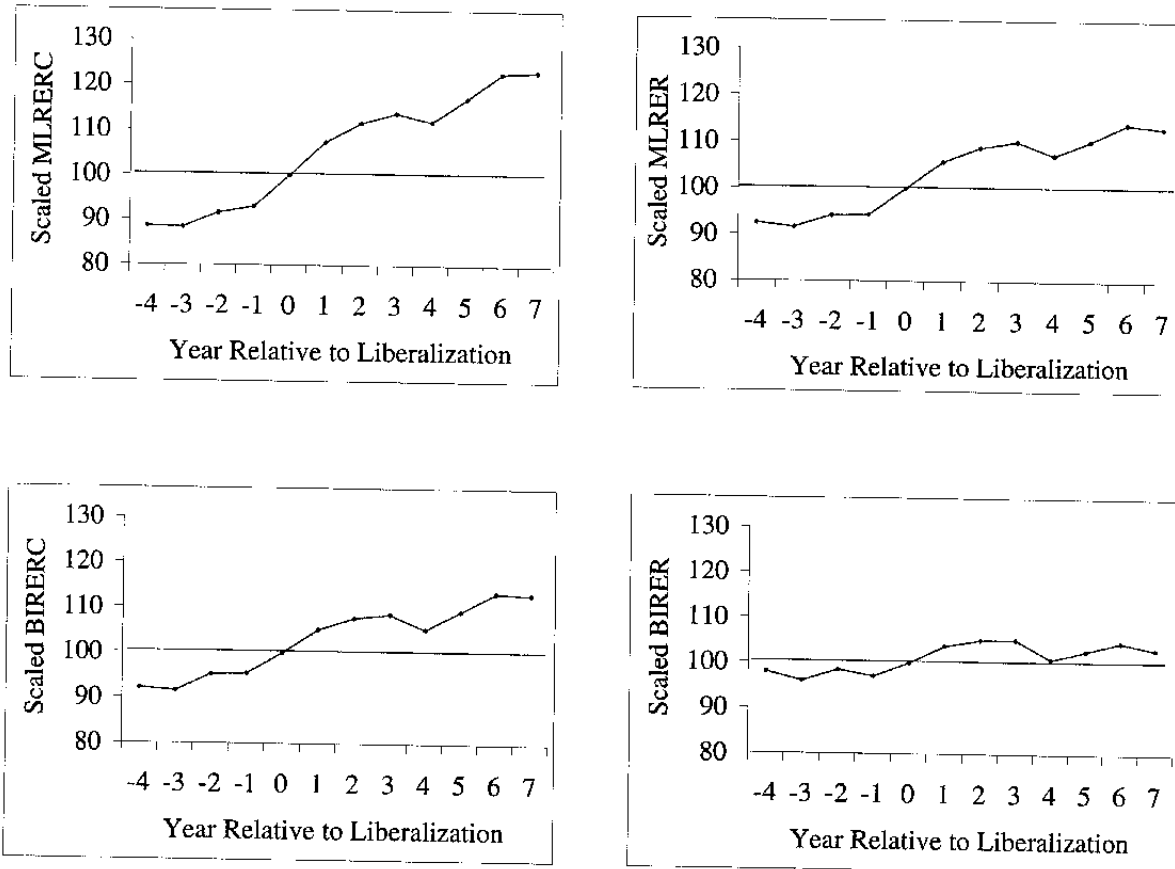


Notes:

- (1) The lines are the mean of the real exchange rate index and its 95 percent confidence band.
- (2) Real exchange rate indices are scaled such that in the year when trade liberalization began (Year=0) the indices equaled 100. For the purpose of exposition, two extreme cases: trade liberalization in Ghana in 1983 and trade liberalization in Guyana during 1988-1992, are not shown in this plot. The indices for these two countries rose to more than 500 three years after the trade liberalization.

To distinguish the movement of the real exchange rate at different stages of a trade liberalization, a set of dummy variables are used in the model. The other variables in the econometric model are based on the theory of equilibrium real exchange rate movement presented in Section II. These include productivity growth, terms of trade, government expenditure, and inflows of capital. Because nominal prices and wages are inflexible downward, the adjustment of the real exchange rate toward equilibrium can be slow. This suggests that the movement in the real exchange rate may be autocorrelated and stabilization policy may lead to real exchange rate misalignment in the short run. Therefore it is important to control for the stabilization effect and the real exchange adjustment to short-run deviations from the long-run equilibrium. To capture the influence of both long-run and short-run factors pertaining to the real exchange rates, the following econometric model is estimated using a panel data set:

Figure 3: Average Real Exchange Rate Across Countries Around Initiation of Trade Liberalization



Note: Real exchange rate indices are first scaled so that in the year when trade liberalization began (Year=0) the indices equaled 100 and then are averaged across the sample. The two exceptional cases, Ghana in 1983 and Guyana during 1988-92, are excluded in the computation; the plots present lower bounds of the average depreciation of the whole sample.

$$\begin{aligned} \hat{RER}_{it} = & a + \beta_1 LIB_{it} + \beta_2 \Delta LIB_{it} + \beta_3 \Delta OPEN_{it} + \beta_4 RERDEV_{it-1} \\ & + \beta_5 RGRW_{it} + \beta_6 TOT_{it} + \beta_7 \Delta GOV + \beta_8 CFLW_{it} \\ & + \beta_9 \hat{RER}_{it-1} + \beta_{10} STAB_{it} + \alpha_i + \eta_{it} \end{aligned} \quad (8)$$

$\hat{}$ = percentage change;

Δ = change;

RER_{it} = real exchange rate index of country i at year t ;

LIB_{it} = liberalization dummy, assuming one for years during country i 's trade liberalization episodes ;

$OPEN_{it}$ = openness dummy, assuming one once the most recent trade liberalization episode started.

$RERDEV_{it-1}$ = percentage deviation of the real exchange rate from its long-run equilibrium level. ²

$RGRW_{it}$ = relative GDP growth rate of country i at time t relative to its major trading partners; it is a proxy for relative productivity growth of country i at time t vis-a-vis its major trading partner. ³

TOT_{it} = terms of trade index;

GOV_{it} = share of government expenditure in GDP;

$CFLW_{it}$ = ratio of net capital flows to GDP;

$STAB_{it}$ = a dummy for stabilization; it is approximated by setting the values to 1 when the first difference of inflation is -5 percent or less;

a = constant;

α_i = individual effect;

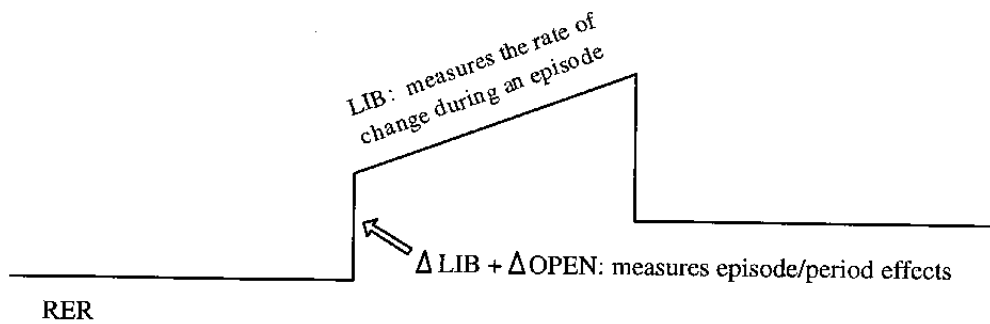
η_{it} = random error.

The roles and values of the dummy variables are illustrated in Figure 4 and Appendix III. The preceding graphic analyses indicate that the real exchange rate depreciate faster at the start of the trade liberalization than during the episode, implying a possible "episode effect". To distinguish this "episode effect" from progressive changes as a trade liberalization unfolds, both LIB and ΔLIB are included in the model. In addition, $\Delta OPEN$ is added to examine potential

²To construct $RERDEV$, the following equation is fitted country by country:
 $RER = \tilde{c} + \tilde{b}_1 t + \tilde{b}_2 t^2 + \tilde{b}_3 t^3 + D\tilde{EV}$. $RERDEV = \frac{D\tilde{EV}}{RER}$. Here $\tilde{}$ indicates ordinary least squares estimates.

³The following equation is used in calculating the relative GDP growth rate:
 $1 + RGRW_{it} = (1 + GRWTH_{it}) / \prod_j (1 + GRWTH_{jt})^{W_{ij}}$, where j indexes partner countries, $GRWTH$ represents the GDP growth rate, and W_{ij} is the same trade-based weights used in constructing multilateral real exchange rates.

Figure 4: Roles of Dummy Variables



different responses of the real exchange rate in the earlier trade liberalization episodes than the most recent one, especially because for almost all countries the last or only trade liberalization episode in the sample occurred in the late 1980s and 1990s, when the globalization trend became an irresistible trend ⁴.

To disentangle the effect of trade liberalization on the real exchange rate from the short-run adjustment of the real exchange rate to its long-run equilibrium, *RERDEV* is included as a right-hand-side variable.⁵ A trade liberalization decision may depend on the real exchange rate. Specifically, trade liberalization may occur systematically when the real exchange rate is either overvalued or undervalued. It is possible that policymakers systematically choose to liberalize trade when the real exchange rate is undervalued so that the economy is less vulnerable to outside competition, minimizing political opposition. This line of reasoning suggests that the decision to liberalize trade may be positively associated with a undervalued and appreciating real exchange rate. Empirically, however, it seems that trade liberalization is likely to take place when the real exchange rate is overvalued and depreciating. A cursory check of the background of these liberalization episodes shows that many countries actually liberalized trade after a period of continued deterioration of economic condition, consistent with the finding of Rodrik (1992) that crises can foster trade liberalization. Therefore, it is very likely that many trade reforms took place when the real exchange rate was overvalued, corresponding to a depreciating exchange rate before the start of the reform as observed in the sample discussed in Section A.

To examine whether the economy reacts to shocks differently during and after trade liberalization, interaction terms were used in Equation 8. The panel dataset used in this study contains annual data between 1970 and 1995 for 62 countries, 45 of which liberalized their trade system (some more than once) during the sample period. It also included, as a control, 17 countries which had low trade barriers throughout the period. These countries are the United States, the United Kingdom, Austria, Denmark, France, Germany, Italy, the Netherlands, Norway,

⁴In the sample, two exceptions are the only trade liberalization episode in Greece (1978–81) when it joined the European communities and the second liberalization episode in Korea (1981–94)

⁵This term is, in essence, equivalent to the error correction term in the error correction model.

Table 3: Econometric Results

Independent Variable	RER Index (Dependent Variable)				
	$ML\hat{R}ERC$		$ML\hat{R}ER$	$BIR\hat{E}RC$	$BI\hat{R}ER$
<i>LIB</i>	5.43 (2.62)	5.31 (2.09)	5.47 (2.23)	4.81 (1.90)	5.35 (2.21)
ΔLIB	-12.19 (-4.14)	-10.67 (-3.43)	-10.43 (-3.47)	-9.47 (-3.04)	-9.65 (-3.25)
$\Delta OPEN$	13.61 (2.97)	10.52 (2.17)	11.02 (2.35)	12.45 (2.57)	13.05 (2.82)
<i>RERDEV</i>	-0.79 (-46.94)	-0.79 (-46.32)	-0.80 (-48.23)	-0.77 (-45.56)	-0.77 (-48.51)
<i>RGRW</i>	0.01 (0.045)	-0.02 (-0.11)	0.01 (0.08)	-0.03 (-0.17)	0.05 (0.34)
<i>TÔT</i>	0.06 (1.17)	0.04 (0.71)	0.04 (0.78)	0.04 (0.63)	0.03 (0.61)
ΔGOV	-0.72 (-1.80)	-0.71 (-1.75)	-0.66 (-1.69)	-0.81 (-2.01)	-0.70 (-1.83)
<i>CFLW</i>	-0.16 (-0.22)	0.51 (2.66)	0.51 (2.77)	0.23 (1.18)	0.27 (1.48)
$R\hat{E}R_{t-1}$	0.098 (5.64)	0.10 (6.00)	0.11 (6.60)	0.12 (6.88)	0.13 (7.52)
<i>LIB</i> × <i>TOT</i>		0.10 (0.64)	0.10 (0.69)	0.10 (0.66)	0.12 (0.86)
<i>OPEN</i> × <i>TOT</i>		0.04 (1.86)	0.03 (1.30)	-0.01 (-0.22)	-0.02 (-0.93)
<i>LIB</i> × <i>CFLW</i>		-0.79 (-2.96)	-0.82 (-3.20)	-0.75 (-2.81)	-0.78 (-3.08)
<i>OPEN</i> × <i>CFLW</i>		-0.54 (-2.63)	-0.55 (-2.74)	-0.25 (-1.21)	-0.29 (-1.45)
<i>STAB</i>	-2.34 (-1.24)	-2.58 (-1.38)	-2.87 (-1.59)	-2.77 (-1.48)	-2.70 (-1.52)
<i>a</i>	-0.84 (-1.00)	-3.61 (-2.51)	-3.69 (-2.66)	-1.42 (-1.00)	-1.94 (-1.43)
R^2	0.69	0.70	0.72	0.70	0.72
$F(n_1, n_2)$	235.44	172	186.90	166.39	188.55
n_1	10	14	14	14	14
n_2	1039	1035	1035	1012	1012
Sample Size	1111	1111	1111	1087	1087
Number of Countries	62	62	61	61	61
Average Year	17.9	17.9	17.9	17.8	17.8

Note: Numbers in () are *t*-statistics. The bilateral real exchange rate for the United States is not defined. Therefore the United States is excluded from the regressions where the bilateral real exchange rate is the dependent variable.

Sweden, Switzerland, Canada, Japan, Finland, Ireland, Australia, and Singapore. The open dummy for these countries is set to 1 for the whole period. Some developing countries in my sample have shorter time spans due to availability of data.

Because a lagged dependent variable is included, the fixed effect model is used in all the estimation. The results are presented in Table 3.

Table 3 shows that the coefficient for $\Delta OPEN$ is positive and highly significant in all of the regressions, indicating that when countries last liberalize their trade, their real exchange rate depreciates by 13.6 percent when interaction terms are excluded or 10.5 percent to 13.1 percent when interaction terms are introduced. The coefficient for ΔLIB is negative and highly significant in all of the four regressions. Recall the construction of the dummy ΔLIB and

$\Delta OPEN$. For countries that underwent multiple episodes of trade liberalization, the coefficients of ΔLIB indicate the difference between the level of the real exchange rate during the earlier trade liberalization period and the level during the normal period; the sum of the coefficients for ΔLIB and $\Delta OPEN$ indicates the movement of the real exchange rate at the start of the most recent (or only) trade liberalization episode of a country. The results indicate that the early trade liberalization episodes are associated with a real appreciation of 9.5 percent to 12.1 percent; at the start of the most recent trade liberalization episodes the real exchange rate depreciated by 0.6 percent to 3.4 percent. The coefficient of LIB is positive and significant, indicating that the real exchange rate tends to depreciate by 4.8 percent to 5.5 percent annually as trade liberalization proceeds.

The coefficient of the share of government spending in GDP are negative and significant at the 10 percent level, indicating that a 1 percentage point increase in the share of government expenditure will lead to a 0.7 percent to 0.8 percent appreciation in the real exchange rate. The coefficient for lagged percentage change in the real exchange rate is small in absolute value but highly significant, indicating that the change in the real exchange rate is serially correlated. In all the regressions, the coefficient of the relative GDP growth rate, $RGRW$, is insignificant, indicating that the Samuelson-Balassa effect is insignificant in determining the short-run real exchange rate movement. Change in the terms of trade is never a significant factor of the real exchange rate, with the absolute value of t -statistics being less than 1 in all cases.

The correlation between the real exchange rate and net capital inflows changes over time. The coefficients for net capital inflows are positive in models where interaction terms are included and significant when multilateral real exchange rate indices are used. This means that before a country last liberalize their trade systems, a 1 percentage increase in net capital inflows is associated with an average 0.5 percent real depreciation. One possible explanation is that capital flows are endogenous to the real exchange rate. When the real exchange rate is overvalued, capital flight occurs. The coefficient for net capital flows captures this endogenous upward bias. Because there is no good instrument for net capital flows, and the effect of net capital inflows on the real exchange rate is outside the scope of this research, this hypothesis is not tested here. The coefficients for the interaction terms between net capital inflow and the open and liberalization dummy variables ($OPEN \times CFLW$ and $LIB \times CFLW$) are negative and highly significant. This implies that during a trade liberalization period and once a country is open to trade, the economy is more sensitive to capital inflows. In response to a 1 percentage point increase in net capital inflows, the real exchange rate appreciates by 0.8 percent during a liberalization episode and 0.3 percent to 0.6 percent after the last liberalization than it was prior to liberalization. This could be a result of a more liberal exchange rate policy stance during and after trade liberalization. Compared with the coefficients for $CFLW$, these two coefficients are less plagued by the endogeneity problem because the coefficients of the interaction terms measure the differences in the response of the real exchange rate to capital inflows. Assuming the effect of the real exchange rate on capital inflows remains the same across time, one would expect the estimated coefficients for capital inflows before, during, and after the opening to suffer from the same bias, which cancels out in the estimated differences. The coefficients of the other three interaction terms are not statistically significant.

That real exchange rate appreciated during early trade liberalization episodes suggests that partial and temporary trade liberalizations are associated with real appreciation. To test whether this result is caused by the stabilization dummy fails to capture real appreciation due to a time lag in price adjustment to stabilization policies, one period ahead of the stabilization dummy, $STAB_{t+1}$, is used in place of $STAB_t$. The results show that $STAB_{t+1}$ is less significant and even takes the wrong sign.

VI. CONCLUSION

Using an event study based on trade liberalization episodes in 45 countries, this paper shows that credible trade liberalizations lead to real depreciation but noncredible ones could lead to short-run real appreciation. Although these results are theoretically well founded, empirical evidence is relatively rare. Existing studies have only tested this hypothesis either indirectly or by using an imprecise measurement of trade barriers.

Four major findings emerge from the analysis. First, without controlling for other factors of trade liberalization, the data show that countries on average experienced 27 percent to 48 percent real depreciation after a trade liberalization; in some countries, the real exchange rate appreciated. Second, controlling for factors such as deviation of the real exchange rate from its long-run equilibrium, relative GDP growth, the terms of trade, the share of government spending in GDP, and capital inflows, the real exchange rate depreciates by 10.5 percent to 13.6 percent after a country opens its economy to trade. Third, as trade liberalization proceeds during a liberalization episode, the real exchange rate depreciates by 4.8 percent to 5.5 percent annually. Fourth, in countries that underwent multiple episodes of trade liberalization, early trade liberalization episodes appear to be significantly different from the last episode. During early episodes, the real exchange rate appreciated by 9.5 percent to 12.1 percent. In contrast, at the start of the last (or only) trade liberalization episode of a country (almost all these episodes occurred after late 1980s when globalization had become the dominant trend) the real exchange rate depreciated by 0.6 percent to 3.4 percent. Because the earlier episodes were partial liberalizations and some were even partially reversed, this lends support to the theoretical finding that noncredible trade liberalization could cause short-run real appreciation.

I. TRADE LIBERALIZATION EPISODES

Table 4: Trade Liberalization Episodes

Years	Countries	Years	Countries	Years	Countries
1976-79	Argentina	1990-92	Honduras	1986	Paraguay
1988-91	Argentina	1985-88	India	1991-91	Peru
1992-94	Barbados	1991-94	India	1979-81	Peru
1992-93	Benin	1985-92	Indonesia	1986	Philippines
1988-93	Brazil	1989-93	Jamaica	1981-83	Philippines
1990-94	Cameroon	1988-93	Kenya	1991-95	Philippines
1974-79	Chile	1978-79	Korea	1977-80	Portugal
1985-92	Chile	1981-94	Korea	1970-74	Portugal
1992-95	China	1993-95	Malaysia	1977-80	Spain
1992	Colombia	1988-91	Mali	1970-74	Spain
1985-89	Colombia	1989	Mauritania	1989-93	Sri Lanka
1973-79	Colombia	1985-87	Mexico	1990	Thailand
1986-87	Costa Rica	1983-89	Morocco	1994-96	Thailand
1986-92	Ecuador	1991-93	Nepal	1986-93	Tunisia
1986	Gambia	1984-92	New Zealand	1980-85	Turkey
1983	Ghana	1986-87	Nicaragua	1993-94	Uganda
1986-92	Ghana	1991-92	Nicaragua	1991-94	Uruguay
1970-81	Greece	1986-87	Nigeria	1974-81	Uruguay
1987-88	Guatemala	1972-78	Pakistan	1989-92	Venezuela
1987	Guinea-Bissau	1989-95	Pakistan	1992	Zambia
1988-91	Guyana				

Argentina

1976-79: Significantly reduced quantitative restrictions (QRs) and tariffs. Implicit tariff (gap between domestic term of trade and international term of trade) decreased from 57 percent in 1975 to 29 percent in 1979. This gap increased to 44 percent in 1980 and dropped to 29 percent again in 1983.

1988-91: Reduced tariff and QRs. Average tariffs reduced from over 40 percent to 12.2 percent mainly through modifications made in October 1988, October 1989, and April 1991. QRs coverage fell to less than 2 percent of manufacturing value added. Abolished import licensing.

Sources: (General Agreement on Tariff and Trade 1992a, Canitrot and Junco 1993, Cavallo and Cottani 1991, Economist Intelligence Unit 1985-97, Henry 1997b).

Barbados

1992-94: Average tariff was reduced from 68.3 percent in 1993 to 11.80 percent in 1995.

Source: (Lora 1997)

Benin

1991–93: Abolished most quantitative restrictions and simplified import tariffs. In 1993, removed remaining import licensing controls. In January 1994, simplified the tariff structure from 12 rates to 4. At the same time, eliminated the system of reference values.

Sources: (World Bank 1993b, World Bank 1995).

Brazil

1988–94: Implemented trade liberalization, deregulation, and privatization. Abolished import prohibitions on close to 1,800 goods, most quota restrictions, and import control through exchange allocation. Average tariff reduced from 74.6 percent in 1986 to 11.64 percent in 1994. Formed Mercosur common market in 1994.

Sources: (Canitrot and Junco 1993, Economist Intelligence Unit 1985–97, World Bank 1995, Henry 1997b, Lora 1997).

Cameroon

1990–94: In 1990, lifted import licensing on most goods not subject to quantitative restrictions and quantitative restrictions that applied to about 105 categories of goods. In January 1994, implementing the Central African Customs Union trade and tariff reform, introducing a four-rate common external tariffs of 5, 10, 20, and 30 percent and an intra-union preferential rate of 20 percent. Under the old regime some imports were taxed as much as 80 percent

Sources: (Economist Intelligence Unit 1985–97, World Bank 1995).

Chile

1974–79: Tariffs were reduced three times during 1974 and once in 1975. The simple average tariff rate was reduced from 105 percent in the beginning of 1974 to 38 percent by the end of 1975. Abolished all quotas and official approvals for import operation in 1974. Eliminated direct prohibition of all but six tariff positions and prior deposits between 1976 and 1979. In 1975 announced tariff reduction plan and from 1976 to August 1977 reduced tariffs to a range of 10-35 percent, bringing simple average tariff to 10.1 percent. In 1983, increased the uniform tariff to 20 percent. In 1984, increased it further to 35 percent and imposed an extra 15 percent tariff on 240 luxury imports.

1985–92: Reduced average tariff from 36 percent in 1985 to 11.97 percent in 1992. Further lowered non-tariff barriers.

Sources: (de la Cuadra and Hachette 1991, General Agreement on Tariff and Trade 1991, Henry 1997b, Lora 1997).

China

1992–95: In 1992, announced sizable reductions on 225 tariff lines and abolition import regulatory duties. In 1994, abolished the foreign exchange retention system and mandatory import plan. In addition, eliminated import licensing requirements and quota controls on 320 items. In 1995, abolished import restrictions on 367 tariff lines. Average tariff fell from 43 percent in 1992 to 36 percent in 1995 and to 23 percent in 1996.

Sources: (Economist Intelligence Unit 1985–97, Thomas and Wang 1997).

Colombia

1973–79: Eliminated foreign exchange budget drawn by the Monetary Board. Increased items on free list from 3.1 percent in 1971 to 67 percent in 1979. The percentage of items on prior licensing list dropped from 81.0 percent in 1971 to 36.7 percent in 1979. Average tariff (including surcharges) dropped from 50.7 percent in 1972 to 34.4 percent in 1980. In 1975, imposed severe controls on capital movements for the private sector. In late 1981, began to reverse the liberalization policy. Between late 1982 to 1984 eliminated free-import list and reestablished prohibited import list.

1985–89: In 1985, removed 1,360 items from the prior licensing to free import list and put 760 prohibited imports on the prior licensing list. Increased goods under the free import regime from 27 percent in December 1985 to 39 percent in 1989. Made the prior license regime more flexible. Average tariff dropped from 31 percent in 1987 to 26 percent in 1989.

1992: Eliminated import quotas and reduced import tariffs from an average effective rate of 44 percent in 1989 to 11.6 percent. Signed a free trade and custom union agreement with Venezuela.

Sources: (Economist Intelligence Unit 1985–97, Garcia 1991, General Agreement on Tariff and Trade 1990a).

Costa Rica

1986–87: Reduced tariffs from 53 percent in 1985 to 26 percent in 1987.

Source: (Lora 1997)

Ecuador

1986–92: Liberalized trade. Reduced average tariff gradually over the year from 50 percent in 1985 to 11.6 percent in 1992. Recently joined Colombia, Venezuela, and Bolivia in a free trade arrangement.

Sources: (World Bank 1995, World Bank 1994b, Lora 1997).

Gambia

1986: In January 1986, removed restrictions on all imports under open general license. Subsequently introduced market determined exchange rate. Liberalized foreign exchange control. The trade liberalization was a part of a comprehensive macroeconomic stabilization and adjustment program.

Sources: (Economist Intelligence Unit 1985–97, World Bank 1995).

Ghana

1983: With the assistance of the IMF and the World Bank, Ghana started Economic Recovery Program in 1983. Reduced tariffs to a range of 10-30 percent, with 30 percent applied to most imports dutiable; loosened controls on exchange and imports. Used fiscal and monetary policy to bring down inflation from 123 percent in 1983 to 37 percent in 1990.

1986–92: Abolished licensing, prohibition, and foreign exchange rationing. Unified exchange rate. Reduced tariff across board by 5-25 percent. In 1988, introduced special additional import tax of mainly 40 percent on a range of consumer goods, accounting for half of manufacturing value added; these tax were reduced to 10 percent in 1992.

Sources: (World Bank 1991, World Bank 1995, Leechor 1994, General Agreement on Tariff and Trade 1992c).

Greece

1970–81: Reduced tariffs and removed QRs and import deposits. Reduced tariffs each year between 1970–80 except for 1976, 1978, and 1979. In 1981, Greece became a member of EEC.

Source: (Kopits 1989).

Guinea-Bissau

1987: Liberalized price and exchange rate system, eliminated quantitative restrictions on 75 percent of imports, substantially reduced import duties, and started the transformation of the

overextended public sector.

Sources: (World Bank 1993b, World Bank 1995).

Guatemala

1987–88: Reduced tariffs from 50 percent in 1985 to 25 percent in 1987. In 1988, unified the exchange rate system and rationalized tariff levels. Reduced tariffs by 5-25 percent and the import tax from 40 percent to 10 percent

Sources: (World Bank 1990, World Bank 1994b).

Guyana

1988–92: The government embarked on an economic recovery program in mid 1988. Reduced tariffs and eliminated most import prohibitions. Unified and liberalized exchange rate regime. On October 1992, adopt the four levels CARICOM common External Tariff (CET) of 5, 10, 15, and 20 percent. It should be noted that 80 percent of imports to Guyana was free of duty in 1990.

Sources: (World Bank 1991, World Bank 1993b, World Bank 1995, World Bank 1993a).

Honduras

1990–92: Average tariff fell from 41.9 percent in 1989 to 17.9 percent in 1995. Abolished import permits and foreign exchange allocations; first brought maximum tariff down to 40 percent and then to 20 percent in January 1993. By 1993, the tariff rates were within a 5 to 20 percent band.

Sources: (World Bank 1993b, Economist Intelligence Unit 1985–97, Lora 1997).

India

1985–88: Expanded the list of importable items, reduced tariff levels, liberalized export licensing, reduced custom duties and excised duties on selective items. In 1988, released a three-year import liberalization package with the following four major changes: (1) classified 745 new items under open general license; (2) eliminated the state monopoly for 56 importers; (3) allowed exporters to import capital goods freely provided they export at least 25 percent of production; and (4) extended export benefits to suppliers of raw materials and components to manufacturing exporters.

1991–94: Maximum tariff reduced from 350 percent in 1990 to 65 percent, lowering average tariff from 87 percent in 1990 to 33 percent in March 1994. Eliminated a costly subsidy scheme for exports, abolished almost all licensing restrictions on imports of capital and intermediate

goods, liberalized foreign exchange control, allowed full current account convertibility. Trade liberalization were taken as a part of a comprehensive economic stabilization program and a major economic transformation.

Sources: (Whalley 1989, Henry 1997b, World Bank 1995).

Indonesia

1985–92: Structural reforms were undertaken in the 1980s. In 1985, reduced the tariff ceiling from 225 to 60 percent, with tariffs for most products ranging from 5 to 35 percent. The share of imports subject to no-tariff restrictions declined from 43 percent in 1986 to around 13 percent in 1992 while average nominal tariffs have been halved. Effective protection for manufacturing reduced from 68 percent in 1987 to 52 percent in 1992. In 1984, average tariff was 35 percent. It has dropped to 20 percent by 1993.

Sources: (World Bank 1991, World Bank 1992, World Bank 1993b, World Bank 1994a).

Jamaica

1989–93: Eliminated most quantitative restrictions and trade monopolies, liberalized exchange rate, and lowered external tariffs. In 1985, the average tariff rate was 42.05 percent. By 1995, it had been reduced to 12.50 percent. Trade liberalization is a part of a reform program of privatization, tax reform and liberalization of trade started in 1989.

Sources: (World Bank 1995, Lora 1997).

Kenya

1988–93: Liberalization started in 1988. Overall production-weighted tariffs fell from 62 percent in 1989–90 to 45.5 percent in 1991–92. Unweighted average tariffs dropped from 40 percent in 1985 to 34.0 percent in 1991–92. Coverage of quantitative restriction dropped from 40 percent of items (12 percent of imports) to 22 percent of items (5 percent of imports) by 1991. While quantitative restrictions affected most of the manufacturing production in 1985–86, they covered only 28 percent in 1990–91. Highest tariff rate was reduced from 135 percent to 60 percent; the number of tariff categories was reduced from 25 to 12. Reintroduced export retention at a flat rate of 50 percent for all exporters and removed all import controls except for a short negative list.

Sources: (Swamy 1994, World Bank 1995).

Korea

1978–79: Increased the number of automatic approval items (AA) for importation by 162 on the basis of four-digit Customs Cooperation Council Nomenclature (CCCN) classification. Share of

items on AA list increased from 53.8 percent to 68.6 percent. Production weighted average legal tariff rate decreased from 41.3 percent to 34.4 percent.

1981–94: Increased the share of AA items from 68.6 percent in 1980 to 98.5 percent in 1994. Average tariff dropped from 34.4 percent in 1983 to 7.9 percent in 1994. By 1994, 94 percent of tariffs were below 10 percent.

Sources: (General Agreement on Tariff and Trade 1992b, Kim 1991, Henry 1997b).

Malaysia

1993–95: Lowered and eliminated tariffs on over 600 items in 1993 budget, on over 500 items in 1994 budget and 2,600 items in 1995 budget.

Source: (Thomas and Wang 1997).

Mali

1988–91: Substantially simplified the trade regime. Removed export and import monopolies, removed export taxation, simplified and reduced tariffs, replaced licensing system with a registration system, and phased out quantitative restrictions. At the same time, domestic marketing and prices have been fully liberalized.

Sources: (World Bank 1991, World Bank 1993b, World Bank 1995).

Mauritania

1989: Abolished import license and minimum capital requirements for obtaining an import or export card. Trade liberalization was a part of Consolidation Program 1989–91.

Source: (World Bank 1995).

Mexico

1985–87: Substantial reduced quantitative restrictions since mid-1985. Removed all but a few import licensing requirements. Average tariff reduced from 34 percent in 1985 to 10.59 percent in 1988.

Sources: (Rodrik 1992, Lora 1997).

Morocco

1983–89: Reduced quantitative restrictions. Removed specific licenses for all imports and reduced the prohibited items to a handful of products. Share of imports subject to restrictions fell from 100 percent in March 1983 to 12 percent by value and 22 percent by custom tariff headings by 1989. Reduced custom duty ceilings from 400 percent in 1983 to 45 percent by 1989. Eliminated many foreign exchange restrictions and implemented full current account convertibility.

Sources: (World Bank 1994b, World Bank 1995, General Agreement on Tariff and Trade 1990b).

Nepal

1991–93: Established uniformed market determined exchange rate and removed the restriction on current account transactions. Removed quantitative restrictions on all but six imports. Reduced tariff on imports not from India to 3 to 12 percent from 10 to 55 percent. The effective incidence of import duties fell from over 20 percent in the late 1980s to about 9 percent, and the import-weighted average custom duty rate fell to 12 percent in fiscal 1994. At the same time, started to deregulate industrial licensing and encourage foreign investment.

Sources: (World Bank 1993b, World Bank 1995).

New Zealand

1984–92: Gradually phased out licenses, which covers 40 percent of imports in 1984. Eliminated all quantitative controls and other non-tariff measures on imports. Reduced tariffs gradually by 50 percent. Nominal tariff dropped from 28 percent in 1981–82 to 12 percent in 1992–93. Trade liberalization continued. Tariff were further reduced between 1993–96 to 7 percent in 1996.

Sources: (World Trade Organization 1996, Lattimore and Wooding 1996, Rayner and Lattimore 1991).

Nicaragua

1986–87: Average tariff reduced from 54 percent in 1985 to 21 percent in 1987.

1991–92: Unified exchange rate, adjusted tariffs to a range of 10 to 40 percent, eliminated most non-tariff barriers on import and export, and abolished state trading monopolies. Maximum import protection fell to 40 percent by March 1992. Average tariff dropped from 21 percent in 1987 to 17.4 percent in 1995. Trade liberalization was taken as part of structure adjustment.

Sources: (World Bank 1993b, Lora 1997).

Nigeria

1986–87: In September 1986, a major trade liberalization started. Abolished import and export licensing schemes. Reduced the number of import bans from 74 to 16, and eliminated all 11 bans on exports. Removed 30 percent surcharge and adjusted 100 percent advance payment for import duty to 25 percent in 1987. The dispersion of tariffs was significantly reduced and the average nominal tariff was reduced from 33 percent to 23 percent. Decree of 1988 reduced tariff dispersion but increased average tariff to 28 percent. Subsequently, made many revisions to increase protection. Increased duties on 22 items in 1989 and 1990. Banned exports of some agricultural products in 1989 and 1990.

Sources: (Moser, Rogers, van Til, Kibuka and Lukonga 1997, Rodrik 1992).

Pakistan

1972–78: Eliminated most import licensing and export bonus.

1989–95: Reduced nontariff barriers. Reduced maximum tariff from 125 percent to 70 percent by 1995. Trade reform slowed down in 1996. Maximum tariff went down from 70 percent to 65 percent.

Sources: (World Bank 1991, World Bank 1995, World Bank 1996a, Guisinger and Scully 1991).

Paraguay

1986–87: Average tariff reduced from 71.7 percent to 19.29 percent.

Source: (Lora 1997)

Peru

1979–81: Several decrees shifted majority of items from the restricted list to the free-import list. By December 1980, the free import list increased to 98 percent from 37.8 percent in 1979. Reduced maximum tariff from 355 percent to 60 percent in 1980. Eliminated specific duties and tightened exception rules for import. The simple average tariff declined from 40 percent in December 1979 to 32 percent in December 1981. Starting in 1982, increased protection. The simple average tariff increased from 32 percent in 1981 to 57 percent in 1984.

Source: (Nogues 1991).

1991: Reduced average tariff from 68 percent in 1990 to 17.63 percent in 1992. Unified multiple exchange rates; eliminated export taxes on almost all exports; abolished all licensing,

administrative requirements, and official approval of import and export transactions; simplified three-tier tariff system to two-tier system of 25 and 15 percent. The 15 percent tariff rate covered about 80 percent of imports after the reform.

Sources: (Economist Intelligence Unit 1985–97, World Bank 1995, Lora 1997).

Philippines

1981–83: By the end of 1983, average nominal tariff fell to 29 percent from 43 percent in 1980. Liberalized import of 922 items. Starting in late 1983, reversed some of the reform.

1986: Liberalized 936 items of the 1232 import items originally scheduled to be liberalized in early 1980s.

1991–95: Reduced average tariff to 20 percent in 1994. Planned to reduce import weighted tariff to 14 percent (effective tariff rate to 21 percent) by July 1995. Reduced tariff dispersion. Removed quantitative restrictions (more than 100 items) on all but a few products. Allowed free use of foreign exchange funds for current and capital transactions. Reduced the number of import classifications from five to three: (1) freely imported, (2) regulated, and (3) prohibited.

Sources: (World Bank 1995, Henry 1997b, Thomas and Wang 1997, Shepherd and Albuero 1991).

Portugal

1970–74: Substantially reduced tariffs and partially reduced quantitative restrictions. Completely reversed the liberalization in 1974.

1977–80: Reduced tariffs and relaxed quantitative restrictions. Lowered import surcharges and removed compulsory import deposits. Liberalization was partially reversed.

Source: (Michaely et al. 1991).

Spain

1970–74: Cut tariff based on EEC agreement and relaxed quantitative restrictions. Cut tariffs at average or above average by 10 and 20 percent, respectively. In 1975, increased quantitative restrictions.

1978–80: Cut tariffs across the board and relaxed quantitative restrictions. The simple average of nominal tariffs decreased by 17.9 percent. Practically transferred all imports subject to a global quota to the free list.

Source: (de la Dehesa, Ruiz and Torres 1991).

Sri Lanka

1989–93: Significantly liberalized the exchange and trade regimes (except agriculture). Created incentives for both domestic and foreign investment.

Source: (World Bank 1995).

Thailand

1990: Announced measures to relax exchange control significantly. Started a large-scale reform of tariff structure.

1994–96: Reduced the number of tariff rates from 39 to 6 and eliminated most tariffs above 30 percent. Planned to reduce average tariff from 30 percent in 1994 to 17 percent by 1997.

Source: (World Trade Organization 1995).

Tunisia

1986–93: Expanded the list of freely imported goods. Goods not subject to import restriction rose from 18 percent to more than 87 percent of total imports. Reduced maximum tariff rate and raised minimum rate to bring down the dispersion. Special import taxes are abolished. The average tariff dropped from 36 percent at onset of the liberalization program to about 27 percent in 1988. Gradually fully liberalized current account. Established currency convertibility for capital account transactions by foreigners and eased controls on residents' capital transactions.

Source: (Nsouli, Eken, Duran, Bell and Yucelik 1993).

Turkey

1980–85: Lowered tariffs and duties; cut the advance deposit requirement rates gradually to 1 percent for industrial uses and 3 percent for commercial uses; abolished quota list; transferred more than 60 percent of restricted import items to free import list; reduced the number of items requiring official permission from 1,000 to 245; eased restrictions on foreign exchange transactions. Average tariff rates declined from 38.8 percent before December 1983 to 25.3 percent after January 1984. Reduced the items on the prohibited list from 500 to 3.

Sources: (Uygur 1993, Kopits 1987, Onis 1993, Michaely et al. 1991).

Uganda

1993–94: First replaced the licensing of exports and imports by simple registration, and later abolished all quantitative restrictions on imports except for those on a small negative list.

Eliminated the surrender requirement on export earnings; reduced the level and dispersion of duties. Gradually liberalized foreign exchange and established a fully liberalized inter-bank market in November 1993.

Sources: (World Bank 1992, World Bank 1993b, World Bank 1994b, World Bank 1995).

Uruguay

1974–81: Eliminated quantitative restrictions, reduced tariff levels and dispersions, liberalized exchange transaction and international capital flow. Production weighted average tariff dropped from 534.5 to 52.7 percent

1991–94: Average tariff rate reduced from 27.65 percent in 1990 to 9.63 percent in 1995. Changed from a four-tier tariff system at rates of 40–30–20–10 percent to 20–15–6 percent. Reduced the number of non-tariff barriers.

Sources: (Favaro and Spiller 1991, Canitrot and Junco 1993).

Venezuela

1989–92: Unified and floated the exchange rate, abolished foreign exchange controls, and reduced the number and level of import tariffs. Cut the average tariff from 37 to 16 percent and the highest tariff from 135 to 20 percent. Greatly reduced agriculture import licensing. Non-tariff barriers affected only 2 percent of domestic production after the trade liberalization.

Sources: (World Bank 1993b, Lora 1997).

Zambia

1992: Adopted unified and market-determined exchange rate in steps. Increased the items on the open general import list and converted it to a negative list.

Source: (World Bank 1993b).

II. REAL EXCHANGE RATE INDICES

The following equations are used in compiling the real exchange rate indices:

$$MLRERC = \frac{E_{i,us}}{CPI_i} / \prod_j \left(\frac{E_{j,us}}{CPI_j} \right)^{W_{ij}} \quad (A1)$$

$$MLRER = \frac{E_{i,us}}{CPI_i} / \prod_j \left(\frac{E_{j,us}}{WPI_j} \right)^{W_{ij}} \quad (A2)$$

$$BIRERC = \frac{E_{i,us} CPI_{us}}{CPI_i} \quad (A3)$$

$$BIRER = \frac{E_{i,us} WPI_{us}}{WPI_i} \quad (A4)$$

where i indicates home country and j indicates partner countries. $E_{i,us}$ is the nominal exchange rate of country i in local currency per U.S. dollar, and W_{ij} is the share of j in country i 's total trade with its major partners. An increase indicates real depreciation.

In constructing these indices for 73 countries, the following rules are used:

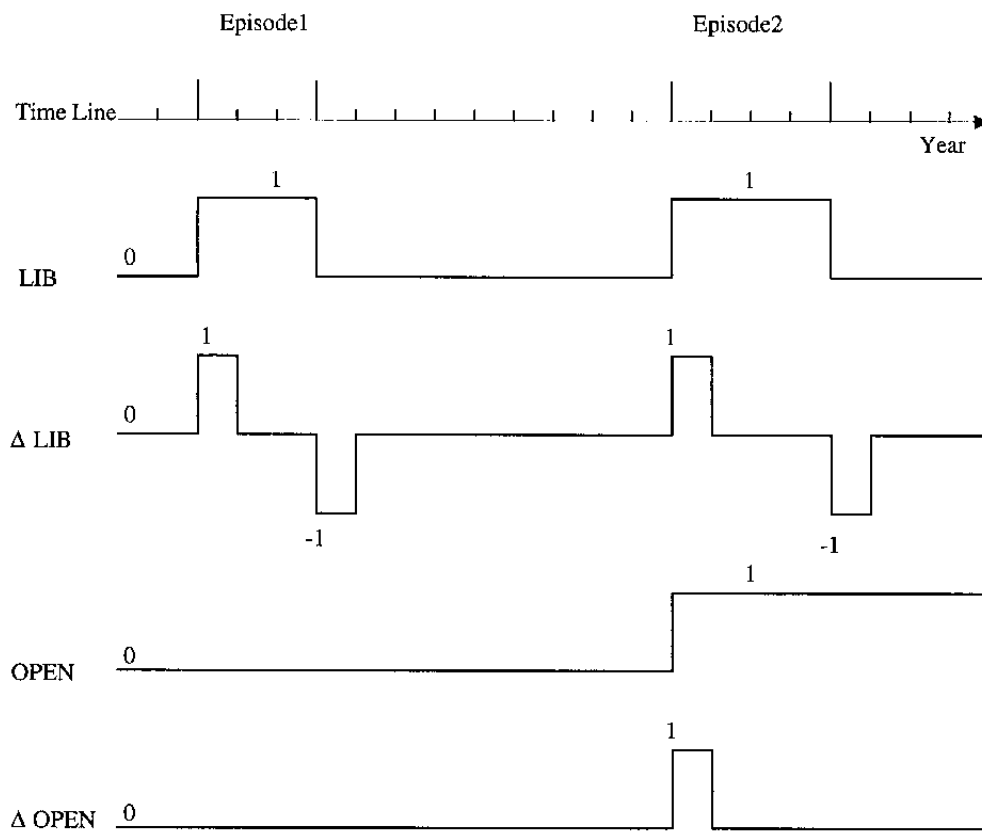
- (1) The trade weights W_{ij} are calculated based on 1985 trading data in the IMF *Direction of Trade Statistics*. All countries whose share in the sample country's trade is larger than 10 percent are selected as the major partners in calculating MLRERC and MLRER with the exception of China, Turkey, Hong Kong SAR, Finland, and the USSR, which are excluded as the partner countries due to incomplete CPIs and WPIs data.
- (2) Average annual real exchange rates are computed from monthly real exchange rate indices normalized by setting the values in 1990 equal to 100.⁶ Some countries have shorter data series due to missing data.
- (3) End of month and monthly price data are from *International Financial Statistics*. In calculating MLRER, CPIs are used in place of WPI for partner countries with incomplete WPIs.

⁶For the Dominican Republic and Benin, 1990 data are missing. The real exchange rate in 1980 is set to 100 for the Dominican Republic; the real exchange rate in 1991 is set to 100 for Benin.

III. DUMMY VARIABLE VALUE

The following diagram illustrates assignment of value to the dummy variables used in the econometric model (Eq. 8). In this example, the country liberalized twice during the sample period.

Figure 5: Values of Dummy Variables



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