REAL EXCHANGE RATE MISALIGNMENT AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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ABSTRACT

It has long been recognized in academic and policy debates that domestic policies play an important role in explaining economic growth. This paper focuses on the impact of exchange rate misalignment on economic growth in developing countries. An analytical framework is first developed to estimate real exchange rate (RER) misalignment. Using recent data from 33 developing countries, the relationship between the mean growth rate of per capita GDP and RER misalignment is then investigated. The results indicate that average real exchange rate misalignments are negatively correlated with economic growth. Inappropriate exchange rate policies therefore contribute to the poor economic performance that many developing countries experience.

INTRODUCTION

The poor economic performance in some parts of the developing world and the outstanding and admirable record in others, are not without posing serious challenges to researchers as to why economic growth differs so much across countries and regions. This economic disparity defined the objectives of many theoretical and empirical studies that seek to explain the sources of economic growth.

Interest in explaining the impressive performance in many Asian countries during the past three decades, centers on whether their success is the result of simple accumulation of factors of production, increased total factor productivity (improvement in technology, and efficiency), or sound government policies. Lim (1994) claims that the spectacular East Asian growth is due to superior accumulation of physical and human capital, but also prudent government intervention in allocating those resources to highly productive investment. Using a stepwise and a backtracking approach to explaining differences in growth, he concludes that the sources of economic growth in the newly industrialized countries are the adoption of a market-friendly and internationally competitive approach to growth. Young (1994, 1995) and Kim and Lau (1994) also downplay productivity growth in explaining the Asia miracle. It may be tempting, according to Collins and Bosworth (1996), to conclude that economic growth in developing countries can be enhanced by speeding up the catch-up process in adopting the more efficient technology of the industrialized countries. This does not appear to be the case, especially in the East-Asian success where gains in total factor productivity account for only one-fourth of the region's per capita output growth over the past three decades.

Contrary to capital formation per se, Romer (1990, 1993), and Pack (1992) point at productivity gains (in terms of catch-up with the technologically advanced economies, and utilizing it productively within the domestic economy) as the driving force behind the Asian miracle. Productivity gain, as a fundamental source of economic growth, is also advocated by Barro and Sala-i-Martin (1992) and King and Levine (1994).

Of equal importance, are studies that focus on regions with poor economic records. Much of the literature on those regions point at deep-rooted economic constraints that severely hampered growth and development (World Economic Outlook, 1995), including rapid population growth, low human capital development, inadequate economic and social infrastructure, structural and institutional rigidity, and inappropriate macroeconomic policies (especially foreign exchange rate policy leading to overvaluation). If these domestic factors are the main culprits of those regions' inability to grow, major reforms are in order. For Jones and Kiguel (1994), the economic decline in Africa, for instance, is mainly the result of a lack of sustained reform, not a failure of the reforms themselves. Evidence indicates that countries that have pursued major and appropriate reform policies did record gains in real per capita GDP.

The dismal economic performance in the developing world has, overtime, led to two schools of though. Some analysts echo the view that domestic factors are the main culprit of the poor economic record (Jones and Kigel, 1994; Sachs and Warner, 1997). Others trace the problem to external factors (including, terms of trade deterioration, external debt, and world economic instability) that are mostly outside the control of domestic authorities. According to Wheeler (1984), external factors are most important in explaining economic growth. In a similar vein, Deaton and Miller (1996), Ghura (1995), Skinner (1997), and Wheeler (1984), reported a positive relationship between terms of trade and African economic growth.

Given the success in East Asia and other parts of the developing world despite unfavorable external environment, it can be argued that domestic policies in poor countries are not conducive to growth, and therefore played a bigger role in their economic dismal. Among the domestic determinants of economic growth, real exchange rate is believed to be one of the most important relative prices in an economy. "Maintaining an appropriately valued currency" is, therefore, a crucial condition to improving economic performance in developing countries (IMF, 1997).[1]

The discussion above clearly shows that most of the empirical studies on economic development concentrate on the accumulation of physical and human capital, total factor productivity, structural and institutional rigidity, as fundamental sources of economic growth. Despite its importance, however, little effort is devoted in recent years to the effects of inappropriate exchange rate policy on economic growth. As Agarwala (1983) has shown, although there are many forms of distortions that can affect macroeconomic performance, real exchange rate misalignment is by far the single most important distortion affecting economic growth. The objective of this paper is, therefore, to investigate the relationship between real exchange rate (RER) misalignment and economic growth in developing countries. A model of economic growth (that incorporates a measure of exchange rate misalignment and a set of explanatory variables generally included in empirical economic growth regressions) is confronted with recent data to determine the contribution of RER misalignment to

economic growth. The rest of the paper is organized as follows. An analytical framework is first developed to construct RER misalignment in developing countries. The relationship between the mean growth rate of per capita GDP and RER misalignment is then explored. Finally, concluding remarks and policy implications are presented.

REAL EXCHANGE RATE MISALIGNMENT

The Model of Equilibrium RER

This section seeks to estimate currency misalignment by assuming that misalignment is a deviation of the actual (or observed) real exchange rate from its equilibrium level.[2] Estimating misalignment as defined above, requires the knowledge of both actual and equilibrium RERs. The empirical challenge however, is that the equilibrium RER is not observable. Theoretical and empirical studies that address the problem posit that, contrary to the purchasing power parity (PPP) approach, the equilibrium RER is not an *immutable number*, but responds to changes in different variables known as its *fundamentals* (or real factors). The equilibrium (long-run) real exchange rate is thus sensitive to a wide range of macroeconomic variables.

A simplified model is used to derive the equilibrium real exchange rate. The theoretical approach adopted in this study draws on Baffes et al. (1997).[3] Equilibrium RER is defined as the rate that prevails when the economy is simultaneously in internal and external balance for sustained values of policy and exogenous variables. Internal balance holds when the nontradable goods market clears. External balance, on the other hand, refers to current account balances that are compatible with long-run sustainable capital flows.

The model assumes a small open economy that produces and consumes two goods – tradables and nontradables. The tradables are composed of importables and exportables. Total demand for nontradable goods is composed of private-sector consumption (C_{NP}) and government consumption (C_{NG}) on nontradables. Denoting C_p as total private spending (measured in traded goods), θ as the share of that spending devoted to traded goods, and Y_N as the supply of nontradables under full employment, equilibrium in the nontradable market is specified as follows:

$$Y_N(e) = C_{NP} + C_{NG} = (1 - \theta)eC_P + C_{NG} \quad (1)$$

where $e = \frac{P_T}{P_N}$, the real exchange rate defined as the ratio of tradable to nontradable goods prices (P_T and P_N, respectively), both expressed in the same currency.

Equilibrium in the external sector requires that changes in international reserves position, defined as the difference between the current account and capital account, be zero in the long run. The current account balance (Λ) is expressed as the sum of the trade balance (τ), net unilateral transfers (υ), and net investment income (κ). The trade balance is the difference between the supply of tradables ($Y_T(e)$), and the sum of private-sector consumption on tradables (θC_P) and government spending on tradables (C_{TG}). Net investment income is obtained by multiplying total net foreign assets (F) by the real yield on foreign assets (r). External balance is therefore expressed as:

$$\Lambda = \tau + \upsilon + \kappa = Y_T(e) - (\theta C_P + C_{TG}) + \upsilon + rF \quad (2)$$

In Baffes et al. (1997), an additional term (measuring the transaction costs associated with private spending) is included in the trade balance as an outflow.[4] This term is omitted from equation (2) for simplicity.

Combining equations (1) and (2), and assuming external balance in the long run (i.e., $\Lambda = 0$), the real exchange rate (e^*) that ensures equilibrium in the nontradable and external sectors simultaneously can be expressed as follows:

$$e^* = e^*(C_{NG}, C_{TG}, \upsilon + rF) \tag{3}$$

Assuming that the country faces a binding credit ceiling, in which case the trade balance becomes exogenous, equation (3) takes the form:

$$e^* = e^*(C_{NG}, C_{TG}, \tau) \tag{4}$$

The final form of the equilibrium real exchange rate is determined after accounting for the effects of the country's external terms of trade and trade policies. Given a small-country case, with foreign prices of exportables (P_x^*) and importables (P_m^*) exogenously determined, the corresponding domestic prices are:

$$P_x = E(1 - t_x) P_x^*$$

$$P_m = E(1 + t_m) P_m^*$$

where t_x and t_m are exports and imports tax rates, respectively, and E is the nominal exchange rate. The domestic relative price of exports and imports is given by:

$$\frac{P_x}{P_m} = \frac{(1-t_x)}{(1+t_m)} \frac{P_x^*}{P_m^*} = \frac{\varphi}{\lambda}$$

where $\varphi = \dfrac{P_x^*}{P_m^*}$, $\quad \lambda = \dfrac{1+t_m}{1-t_x}$

Changes in the external terms of trade (φ) and trade policy (λ) variables will affect the real exchange rates for exports and imports. The equilibrium real exchange rate (e^*) can therefore be expressed as a function of the external terms of trade and trade policy variables, in addition to the fundamental variables included in equation (4).

$$e^* = e^*(C_{NG}, C_{TG}, \tau, \varphi, \lambda)$$

Technological progress has also been identified in the literature as an important determinant of real exchange rate. The simplified Baffes et al. model (above) can be expanded to incorporate the effect of changes in technology. This can be done by introducing the technological progress variable (r) in the production functions of tradable and nontradable goods. The final form of the equilibrium real exchange rate takes the following form:

$$e^* = e^*(C_{NG}, C_{TG}, \tau, \varphi, \lambda, r) \tag{5}$$

Because of the lack of reliable data on exports and import tax rates (t_x and t_m, respectively) in developing countries, the trade policy variable (λ) is proxied by the

ratio of the sum of the real values of exports and imports to the value of gross domestic product. Trade liberalization policy increases the openness of an economy to international trade, and is expected to lead to a depreciation of the country's real exchange rate.

The effect of exogenous changes in the terms of trade (φ) on real exchange rate depends on the income and substitution effects (and whether the terms of trade shock is due to a change in export price or import price). An improvement in the terms of trade (say, a permanent increase in export prices) increases real national income (income effect) and the demand for both tradable and nontradable goods, leading to an upward pressure on the relative price of nontradables – a real appreciation. It also causes substitution effects on the supply and demand sides that exert a depreciating effect on the real exchange rate. The net effect is ambiguous. Most empirical studies, however, show that the income effect of an improvement in the external terms of trade dominates the substitution effect, causing real exchange rate to appreciate.

The technological progress variable (г) is proxied by the growth rate of real GDP.[5] It is also expected to either appreciate or depreciate the real exchange rate, depending on the sector in which the technological progress occurred. An improvement in productivity results in more efficient production in the sector where the change occurred. According to Balassa (1964), productivity growth tends to be concentrated in the tradable sector and, consequently, countries experiencing rapid technological progress will face a real appreciation of their currencies.

The trade balance variable (τ) is proxied by capital flows, defined as the ratio of the difference between the real values of exports and imports to the real value of GDP. Capital inflows increase domestic spending leading to a real appreciation of the domestic currency. Finally, because of data unavailability on government consumption on tradable and nontradable goods (C_{TG} and C_{NG}, respectively), government consumption is used in place of the two. Given that a high proportion of government spending is devoted to nontradable goods, a rise in government spending will appreciate the real exchange rate.

Equilibrium RER and RER Misalignment

The first step in determining RER misalignment is to estimate the equilibrium RER equation (5). It is estimated using pooled data, with *fixed effects*. This technique allows for different intercept term for each country, but constrains all slope coefficients to be the same. The data are from the World Development Indicators CD-ROM, and the International Financial Statistics CD-ROM. The results (reported in Appendix 1) are quite satisfactory and corroborate the theoretical model discussed above. The coefficients are correctly signed and statistically significant (except for the technological change variable).

The degree of RER misalignment can then be estimated using the results obtained from the previous analysis. First, the estimated coefficients of the equilibrium RER are used to derive the equilibrium RER for sustained values of the fundamentals or real factors (included in equation (5)). The estimated equilibrium RER is then compared to the observed (or actual) RER to determine the misalignments.

Given the sustained values for the fundamentals, equation (5) is expressed as,

$$\log(e^*) = \beta' F^P \tag{6}$$

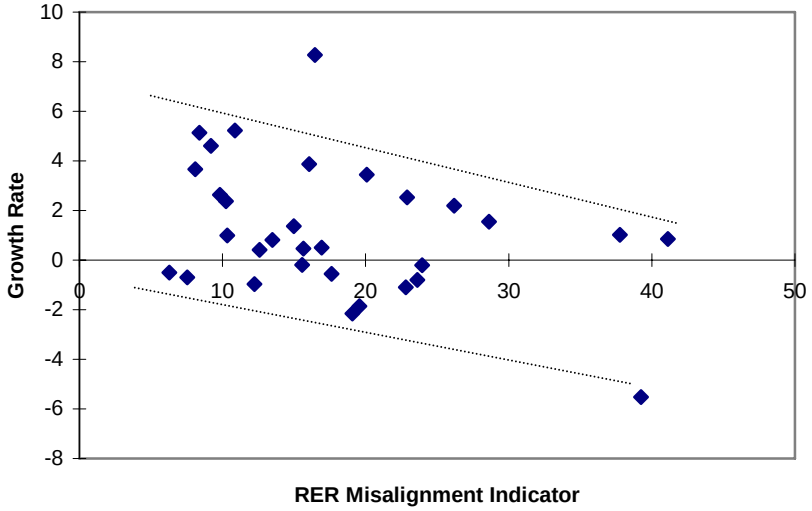
where $\log(e^*)$ is the log of equilibrium RER, β is the vector of the estimated coefficients from equation (5), and F^P is the log of permanent or sustained values for the fundamentals. The latter are obtained using five-year moving average of the observed fundamentals. Equation (6) is used to estimate the equilibrium RER.

The degree of misalignment (Misal) is then derived as the percentage deviation of the actual RER from the equilibrium RER:

$$\text{Misal} = \frac{e - e^*}{e^*} \tag{7}$$

where e and e* are actual and equilibrium RERs, respectively. The RER misalignment indicators obtained are plotted against per capita GDP growth rates for selected developing countries (Figure 1). An increase in the RER misalignment indicator reflects a higher degree of domestic currency misalignment. It can be inferred from Figure 1 that RER misalignments are negatively correlated with economic growth. The adverse impact of misalignment on growth is discussed more thoroughly in the next section.

FIGURE 1
RER MISALIGNMENT AND ECONOMIC GROWTH



REAL EXCHANGE RATE MISALIGNMENT AND ECONOMIC GROWTH

The Literature on RER Misalignment and Economic Growth

Given that real exchange rate is one of the most important relative prices in an economy, it can be argued that a sound exchange rate policy is a crucial condition to improving economic performance in developing countries. The adverse impact of RER misalignment on growth is stressed by Cottani et al. (1990) who assert that, despite many channels through which policy affects performance, there are many instances in which RER is the main transmission mechanism.

An overvalued exchange rate hurts the exports sector and exposes import-competing industries to fierce competition from foreign companies. Overvaluation may lead to tight monetary and fiscal policy (in an attempt by authorities to defend the currency), capital flight (in an anticipation of devaluation), severe decline in foreign direct investment and technological transfers, and a chronic economic recession (as was the case in the CFA zone of Central- and West-African countries from mid-1980s to early 1990s).[6]

Ghura and Grennes (1993), based on pooled time series and cross-section data for 33 Sub-Saharan African countries, found a negative relationship between RER misalignment and economic performance. They concluded that inappropriate domestic macroeconomic, trade, and exchange rate policies appear to be one of the important factors that contributed to the economic distress in virtually all Sub-Saharan African countries. Klau (1998) found that one of the main causes of poor economic performance in the CFA zone from mid-1980s to early 1990s, was the CFA franc overvaluation during that period.

While stable RER was fundamental for promoting East-Asian expansion, persistent RER misalignment hampered development in many African countries, Fosu (2000), Cottani et al. (1990), World Bank (1984). Based on empirical evidence from a cross section of developing countries, Cottani et al. (1990) found a strong negative correlation between per capita GDP growth and the measure of RER instability and misalignment. Although volatile economic environment (including misalignment instability) can also hamper growth (Campa, 1993; Dixit and Pindyct, 1994; and Ghura and Grennes, 1993), Razin and Collins (1997) show that it is RER misalignment that should be associated with slower growth, not its level or variability. In exploring the relationship between RER misalignment and economic growth, they found that while very high overvaluation appears to be associated with slower growth, moderate to high (but not very high) undervaluation appears to stimulate growth. In light of the above discussion, it can be argued that RER misalignment can distort price signals, result in a misallocation of resources across sectors, and generate severe macroeconomic disequilibria.

The Model and Empirical Results

The main objective here is to investigate the link between real exchange rate misalignment and economic growth, by adding the RER misalignment variable to the set of explanatory variables generally included in empirical economic growth regressions. The growth equation takes the following form,

$$y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \qquad (8)$$

where y_{it} is real per capita GDP growth of country i in period t, X_{it} is a vector of explanatory variables, α and β are vectors of parameters to be estimated, and ε is the error term.

The explanatory variables included in vector X are described as follows. Initial per capita GDP (InitialGDP), life expectancy at birth (Life), and secondary school enrolment as a percentage of total relevant age group (School); these variables capture the effects of initial conditions in the respective countries. Cross-country differences in the external environment are captured by the terms of trade (TOT) and standard deviation of terms of trade (StdTOT) variables. Government consumption as

TABLE 1
RESULTS FOR THE ECONOMIC GROWTH REGRESSION
(Dependent Variable: Per Capita GDP Growth Rate, y)

	(1)	(2)	(3)	(4)
Constant			2.714	2.51
			(0.86)	(0.77)
InitialGDG			-0.001	-0.001
			(0.72)	(0.72)
Inv	0.151*	0.148*	0.173*	0.174*
	(3.33)	(3.25)	(4.24)	(4.28)
PopG	-0.848†	-0.861†	-0.919†	-0.911†
	(1.71)	(1.74)	(1.79)	(1.77)
GovC	-0.182*	-0.185*	-0.211*	-0.208*
	(2.68)	(2.69)	(2.90)	(2.82)
Infl	-0.027†	-0.026	-0.022	-0.023
	(1.79)	(1.57)	(1.45)	(1.37)
School	-0.034‡	-0.034‡	-0.030†	-0.030†
	(2.24)	(2.24)	(1.91)	(1.98)
Life			0.033	0.034
			(0.84)	(0.87)
TOT	0.037	0.037	0.036	0.036
	(0.57)	(0.56)	(0.57)	(0.58)
StdTOT			-0.088‡	-0.090*
			(2.57)	(2.72)
Misal	-0.021†	-0.020†	-0.025‡	-0.026†
	(1.83)	(1.72)	(2.07)	(1.93)
StdMis		-0.009		0.007
		(0.32)		(0.23)
Afric	3.048	3.288		
	(1.47)	(1.53)		
Asia	5.105‡	5.316‡		
	(2.43)	(2.43)		
LatAmer	4.334‡	4.527		
	(2.37)	(2.40) ‡		
R^2 (Adjusted)	0.48	0.47	0.50	0.50
DW	1.60	1.59	1.50	1.51
No. Obs.	99	99	99	99

Notes:
t-ratios in parentheses
*, ‡, and † denote significance at the 1%, 5%, and 10%, respectively

a percentage of GDP (GovC) and inflation (Inf) are included to account for the stance of domestic fiscal policy. Population growth (PopG) and investment as a percentage of GDP (Inv) are also included. Finally, RER misalignment (Misal) and standard deviation of RER misalignment (StdMis) variables, are included to capture the effect of exchange rate policy on economic growth.

The data are from the World Development Indicators CD-ROM, and the International Financial Statistics CD-ROM. The variables are constructed for 33 developing countries - 18 in Sub-Saharan Africa, 7 in Asia, and 8 in Latin America, for the period 1985-99 (see Appendix 2 for the list of countries included). Using 1985-89, 1990-94, and 1995-99, for the periods over which averages of data series are taken, a total of 99 observations are obtained for the 33 countries. Four variants of the growth regression equation are considered, each including a different set of explanatory variables and, in some cases, regional dummies (Afric - for Africa; Asia - for Asia; and Latamer - for Latin America). The results, based on pooled annual data for the 33 countries, are reported in Table 1.

The results indicate that fiscal policy matters for economic growth. The fiscal policy variables, proxied by the rate of inflation and government consumption as a percentage of GDP, are negative and (for few exceptions) significant across the four variants of the growth regression equation. The inflation result echoes the view that inflation control, as part of a broad macroeconomic stabilization policy, is an important precondition for economic growth.[7] As for the effect of government spending on economic growth, although sound government policy is crucial, there seems to be a growing consensus that consistent and increasing government presence in an economy can hinder economic growth, especially in developing countries. Economic growth and prosperity may be better served by private enterprises and free market. This view is confirmed by the negative and statistically significant coefficient for the government consumption variable.

The population growth and investment variables have the theoretical signs predicted by the Solow growth model. The population growth coefficient is negative and statistically significant. The coefficient of the investment (as a percentage of GDP) variable is positive and significant, reflecting the importance of capital accumulation for developing countries. There are also indications that terms of trade improvement contributes favorably to economic growth. The TOT coefficient is positive but statistically insignificant. However, uncertainty regarding terms of trade is found to hinder economic growth. The standard deviation of TOT parameter is negative and statistically significant.

The initial per capita GDP (InitialGDP) and life expectancy at birth (Life) both entered the growth regression model with their expected signs, but are statistically insignificant. The secondary school enrollment variable, surprisingly, seems to adversely impact economic growth. Similar results were reported by Knight et al. (1993), Razin and Collin (1997), and Savvides (1995). While Romer (1989) and De Gregorio (1992) found no significant impact of human capital proxy on growth, Barro (1991) on the other hand, reported a positive and significant coefficient for school enrollment. Barro (1994) also reported a positive coefficient for male secondary schooling, but found the initial level of female secondary education to be negatively correlated with economic growth.[8]

Turning now to the main inquiry, the relationship between RER misalignment (and its variability) and economic growth, is investigated. The

regression results indicate that average RER misalignments are negatively associated with economic growth. The coefficient of the misalignment variable is negative and statistically significant in all four variants. The results therefore confirm the critical nature of real exchange rate in determining economic growth. The results also indicate that it is RER misalignment, not its instability, that hampers economic growth. The standard deviation of RER misalignment coefficient is statistically insignificant. The main result, however, corroborates the view that exchange rate policy continues to play a vital role in the economic growth of developing countries. Countries that pursue major and appropriate exchange rate reform to eliminate RER misalignment are very likely to record gains in real per capita GDP.

The results can also be used to predict economic performance under different exchange rate regimes. Flexible exchange rate regimes, by affording freedom of actions, enable the monetary authorities (or the market) to quickly respond to unforeseen and fundamental disturbances that may force the real exchange rate to deviate from its equilibrium level. Fixed (or pegged) exchange rate regimes, on the other hand, limit the authorities' ability to use exchange rate changes as a policy instrument to address external disequilibrium, therefore, leading to chronic misalignment overtime. The results in this study support the view that countries that adopt flexible exchange regimes will experience higher economic growth than countries with pegged rates.

CONCLUDING REMARKS

The difference in per capita growth rates across developing countries has long been a major concern for policymakers and researchers. The economic disparities and the resulting attempts to, at least, alleviate the ever-growing burden of economic distress, led to the investigation of the sources of economic growth. Among the candidates, inappropriate exchange rate policy has been suspected as one of the main deterrents of economic growth. This paper investigates the link between RER misalignment and economic growth in developing countries. The challenge, however, is that RER misalignment is not observable. The first part of the paper, therefore, focused on the estimation of equilibrium RER and the construction of RER misalignment indictor. The estimated equilibrium real exchange rates are used to construct the misalignment indicator. The latter is then used as an explanatory variable in the economic growth regression equation.

The second part of the paper explores the relationship between RER misalignment and economic growth. The results indicate that physical capital, population growth, inflation, and government spending, matter for economic growth. In particular, the results show that average RER misalignments are negatively correlated with economic growth. This confirms the hypothesis that maintaining the real exchange rate at its appropriate level is crucial for economic growth in developing countries. Inappropriate exchange rate policies in many parts of the developing world that generally lead to RER misalignment, may explain, at least partially, the poor economic performance that those regions experience.

ENDNOTES

1. On the role of real exchange rate misalignment see, for example, Dornbusch (1982), Fischer (1986), IMF (1997), and Williamson (1985, 1997).

2. For some countries, there is no data on actual real exchange rate (RER) in the International Financial Statistics CD-ROM. For those countries (shown in Appendix 2), the actual RERs are estimated by the author, using the following RER formula:

$$RER_t = \frac{P_t}{\Sigma_i W_i E_{it} P^*_{it}}$$

where, RER = Real effective exchange rate

E_i = Nominal bilateral exchange rate (Domestic currency value of foreign currency)

W_i = Weight corresponding to trading partner i

P^*_i = Price level of trading partner i

P = Domestic price level

t = Time

The RER is therefore calculated as a weighted average of real bilateral exchange rates of each country's ten most important trading partners, as in Savvides (1995). The 10 most important trading partners are determined on the basis of the average value of exports over 10 years, so as to avoid any bias arising from the choice of single-year export values. The weights (W_i) are computed as each country's share of exports in the total over the selected period.

3. See also Cottani et al. (1990), Edwards (1989a, 1989b, 1994); Elbadawi (1994); and Razin and Collins (1997), for more discussions on the determinants of real exchange rates.

4. These transaction costs, according to Montiel (1997), motivate the holding of domestic money, and are incurred in the form of traded goods and therefore appear as an outflow in the trade balance.

5. Given the difficulty in measuring technological progress, a number of proxies have been used in empirical studies. In Cottani et al. (1990) and Ghura and Grennes (1993), the effect of technological progress is captured in a very simple way by use of a time trend. Razin and Collins (1997) used GDP per worker to capture the effect of productivity growth. Edwards (1994) and Chowdhury (1999), on the other hand, used the rate of growth of real GDP as a proxy for technological progress. Like the time trend proxy, technological progress proxied by GDP per worker and growth rate in GDP, are weak proxies because increase in GDP may be accounted for by factor

accumulation alone, with little or no improvement in factor productivity. However, there is strong evidence that rapid economic growth is associated with technological improvement and real exchange rate appreciation. The cases of Japan, Korea, and Singapore, are illustrative.

6. The CFA zone is comprised of 14 African countries regrouped in two currency unions. In West Africa, Bénin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Sénégal, and Togo, belong to the West African Monetary Union (UMOA), with BCEAO (Banque Centrale des Etats de l'Afrique de l'Ouest or the Central Bank of the West African States) as their common central bank. In Central Africa, Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon, are part of the BEAC zone (Banque des Etats de l'Afrique Centrale or the Central Bank of the Central African States). Each region issues a separate currency. The two currencies (one for each region) commonly known as the CFA franc are equal in value and pegged to the French franc since 1948 and devalued (by 100 percent in domestic currency terms) for the first time in January 1994. With the French franc no longer a legal tender (replaced by the Euro), the CFA franc is now pegged to the Euro). Although the institutions of the CFA franc zone reduced inflation and exchange rate volatility, it is generally argued that they also induced exchange rate misalignment which led to the zone's dismal revenue performance and poor economic growth, especially from the mid-1980s to early 1990s.

7. It is worth, however, mentioning that low-to-moderate inflation may not be immediately counterproductive. According to Bruno (1995), the truly dangerous inflations occur at rates above 40 percent.

8. The negative, especially insignificant, coefficient for schooling may be due to measurement problem (Levine and Renelt, 1992). According to Romer (1989), and De Gregorio (1992), the statistical insignificance of the schooling variable may reflect the collinearity of schooling with physical capital accumulation.

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APPENDIX 1
REGRESSION RESULTS FOR THE EQUILIBRIUM RER

Variables	Coefficients
Constant	Fixed effects
log(Terms of Trade)	0.651
	(14.59)
log(Trade Policy or Openness)	-0.749
	(18.14)
log(Government consumption)	0.125
	(2.66)
Capital Inflows	0.096
	(2.75)
Technological improvements	-0.007
	(0.31)

Figures in parentheses are t-ratios. A positive value signifies a real appreciation, while a negative value refers to a real depreciation of the domestic currency.

APPENDIX 2
COUNTRIES INCLUDED IN THE SAMPLE

Sub-Saharan Africa
Algeria
Burkina Faso*
Burundi
Cameroon
Central African Republic
Congo*
Congo, D.R.
Cote d'Ivoire
Gabon
Gambia
Ghana
Kenya*
Malawi
Nigeria
Senegal*
Togo
Uganda
Zambia

Asia
China
India*
Indonesia*
Malaysia
Philippines
Singapore
Thailand*

Latin America
Chile
Columbia
Costa Rica
Dominican Republic
Ecuador
Guatemala*
Mexico*
Venezuela

* Countries for which data on actual RERs do not exist in the International Financial Statistics CD.ROM. For these countries, the actual RERs are estimated by the author.