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Exchange Rate Economics

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Abstract

The paper summarizes the current theory of how a floating exchange rate is determined, dividing the subject into what determines the steady state and what determines the transition to steady state. The inadequacies of this model are examined, and an alternative "behavioral" model, which recognizes that the foreign exchange market is populated by both fundamentalists and chartists is presented. It is argued that the main importance of understanding the foreign exchange market for development strategy is to permit a correct appraisal of the dangers of Dutch disease. Empirically it seems that from the standpoint of promoting development it is preferable to have a mildly undervalued rate. The paper concludes by examining implications for exchange rate regimes.

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For many years most development economists tended to dismiss the importance of exchange rates as a facet of development policy. They took the view that most developing countries were, and were likely to remain, principally exporters of primary products, whose demand is typically inelastic. Their own demand for imports could be reduced by industrialization ("import substitution"), but the remaining demand for materials and capital goods was price inelastic. Accordingly devaluation was unlikely to be advantageous (the Marshall-Lerner condition was unlikely to be satisfied), so there was no point in adopting a flexible exchange rate policy.[1] Development policy needed to focus on the real economy, not on monetary variables like the exchange rate.

There were several reasons underlying the change that is reflected in the decision of the Growth Commission to seek a paper on exchange rate analysis. One reason is surely recognition of the paradox pointed out in the previous paragraph: If the "pessimistic" case portrayed there were valid, then it would (under weak assumptions) imply that a country had an easy solution to its problems. No one believes that such easy solutions are readily available. Second, Bela Balassa had long argued that one of the factors underlying the success of the East Asian countries had been their policy of ensuring that they always had a robustly competitive exchange rate. The difficulties several of them encountered in 1997 when at least one of their exchange rates became uncompetitive have added force to this argument. Third, it was widely recognized that one of the reasons underlying the Latin American debt crisis of the 1980s was the highly uncompetitive exchange rates that many victims of the crisis had allowed in the preceding years. These overvalued exchange rates were one of the factors that had induced large current account deficits to develop, and their correction was one of the reforms that were held to be necessary to resolve the crisis.

The exchange rate is now recognized to be a decisive link between the internal economy of a country and the international economy. Given the very limited flexibility of internal prices, the nominal exchange rate is key to determining the real exchange rate in the short and medium terms. Real exchange rates are in turn key to determining macroeconomic stability and the incentive to engage in trade. Because of these links, much professional attention has been devoted to analyzing both what actually determines exchange rates and how a government that is concerned with maximizing its nation's growth rate should approach the issue of exchange rate determination. The present paper represents an attempt (but not a completely objective one) to summarize the present state of thought.

Given its importance, even if not appreciated at the time by many developing countries, it is not surprising that so much attention was lavished on the choice of an exchange rate regime in the international discussions that designed the postwar economic order. In the event the architects of that regime chose the "adjustable peg," a system in which the exchange rate was normally (almost) fixed but

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1. The corollary, assuming continuity, is that a government of a developing country should take advantage of its good fortune and revalue, which would improve both the balance of payments and the terms of trade. This corollary was seldom recognized and never turned into a policy recommendation.

could be changed in a jump when a country encountered a "fundamental disequilibrium," meaning a situation in which continued maintenance of its exchange rate peg would have been prohibitively costly. The advantage of such a regime is that it secures fixed exchange rates for most practical purposes while using the exchange rate as an instrument of adjustment when really needed. But this system became progressively less feasible as capital mobility returned and was abandoned in favor of widespread floating (at least among the industrial countries) in 1973. A number of developing countries experimented with a variety of intermediate regimes, but there has been some tendency in recent years for them to follow the industrial countries in adopting floating rates. Indeed, there was at one time a contention that countries ought to adopt a "corner solution" (either floating rates or rates that were firmly fixed by some institutional device like a currency board) and eschew all intermediate solutions. The issue of choosing an exchange rate regime is one that is taken up below.

EXCHANGE RATE ECONOMICS TODAY

Exchange rate economics is primarily devoted to understanding what determines the level, or at least the change, in a floating exchange rate. It is now taken for granted that the exchange rate is an asset price that is determined at a level that ensures that outstanding stocks of various assets (notably those denominated in different currencies) are willingly held, whereas formerly the exchange rate was viewed as determined at a level that would equate the flow demand and supply of foreign exchange.[2] It follows immediately that a floating exchange rate depends upon what is expected to happen in the future rather than exclusively on what is now happening or has happened in the past. The exchange rate is a forward-looking asset price. Its level has implications for the behavior of the current account of the balance of payments, but the current account influences the exchange rate only insofar as forward-looking agents realize that it will influence future asset stocks. (Of course, current account outcomes also depend on saving and investment schedules: Both income flows and exchange rates are determined simultaneously in a general equilibrium setting. These clever forward-looking agents are assumed to know these outcomes.)

While exchange rate economics aim to explain the determination of the level of a floating exchange rate, it also sheds light upon the problems faced by a government that wishes to determine the value of its currency's exchange rate. It is not true that there is a 1:1 relationship between the pressures that are felt by a government attempting to fix its currency's exchange rate and the discrepancy between the

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2. Does not the burgeoning literature on order flows (see, for example, Evans and Lyons 2004) talk in flow terms? Yes, but it does not get us far in explaining the determination of exchange rates. This literature traces the flow of orders into the market and aims to explain exchange rate changes on the basis of variations in the flow of orders. It is presumably true, indeed it is surely almost tautologically true, that exchange rate changes follow order flows, but if the orders are not exogenous then it is what determines the willingness to place orders that are the real determinants of exchange rates. This is what is analyzed in the standard literature.

market exchange rate and the rate that would be established in a competitive market, for market pressure may be negated if a government succeeds in making credible a commitment to hold the rate unchanged. Conversely, a government that is trying to hold a fixed exchange rate but is suspected by the market of being incapable of doing so may face speculative pressures in addition to those that would be generated in a floating market. Nevertheless, any government aiming to manage its exchange rate needs to understand the forces with which it may need to contend, and exchange rate economics illuminate these forces.

It is useful to think of two stages when determining the level of a floating exchange rate. A first stage involves determination of the steady-state level of the real (price-deflated) exchange rate. During this stage, the current account exercises its main influence by pinning down the long-run value of the real exchange rate. There are two versions of what determines this long-run equilibrium value: that it is pinned down uniquely by the purchasing power parity (PPP) condition, and that the equilibrium real exchange rate also depends on variables like the stock of net foreign assets and productivity. A second stage involves adjustment of the exchange rate toward its steady-state level. The standard model attributes this to the representative agent's rational expectation of what will happen between now and the long run. In placing this great weight on rational expectations, based on perfect foresight, of a representative agent, standard exchange rate economics is typical of post-Lucas macroeconomics.

The author is among those who believe that the world is not well represented by the modeling in this tradition, but the first task of this paper is to expound the conventional models and their bases. A subsequent section then explains what some of us believe to be wrong with these models and what alternative approach appears more promising. It is argued that the behavioral approach expounded in particular by Paul De Grauwe deserves attention. The next section of the paper examines the literature on growth and the exchange rate, which has traditionally focused on "Dutch disease" and whether it is dangerous. It is followed by a section that looks at the implications for policy, in particular the question of selecting an exchange rate regime. The final substantive section seeks to summarize questions that merit additional research.

THE STANDARD MODEL

It is suggested above that the standard approach to modeling the exchange rate can be subdivided into explaining the long-run equilibrium rate and explaining a short-run process of transition to equilibrium. Let us start by considering the explanation of long-run equilibrium.

Long-run equilibrium is often conceived as characterized inter alia by a current account imbalance that is such as to keep the ratio of "debt" (actually net international investment position, NIIP, which includes ownership of equity positions as well as debt) to GDP constant. This ratio is stabilized at a

welfare-maximizing level. For a country with its subjective discount rate equal to the world real interest rate, this level would be zero. For a country with a discount rate higher than the world interest rate (i.e., more impatient than the rest of the world), this level would be negative (the country would be a net debtor). For a country with a discount rate lower than the world interest rate, the level would be positive (the country would be a net creditor). The larger the discrepancy between a country's discount rate and the world interest rate, the larger in absolute value is the steady-state ratio of NIIP/GDP. (All these results come from the intertemporal theory of the current account, which is summarized in Obstfeld and Rogoff 1995.)

The larger a country's steady-state NIIP/GDP, the larger will be its steady-state current account imbalance (as a percent of GDP). However, assuming that the interest rate exceeds the growth rate in steady state,[3] the higher current account imbalance is more than entirely accounted for by higher interest payments. The trade balance actually moves in the contrary direction: e.g., a debtor country actually has to run a larger trade *surplus* in steady-state equilibrium if its debt level is higher and therefore its current account deficit is bigger, in order to service the higher level of debt.

Another important characteristic of steady-state equilibrium is that in real terms it is independent of the level of prices. The relative version of PPP prevails as between one position of long-run equilibrium and another.[4] The view that relative PPP holds as between positions of long-run equilibrium position implies either that the shocks that distinguish between equilibrium positions are exclusively monetary, or else that any real shocks are of the second order of importance. Empirical evidence suggests that something close to relative PPP holds as between positions of long-run equilibrium for countries at similar levels of development (Rogoff 1996). But the fact that economists who have estimated long-run equilibrium real exchange rates have succeeded in estimating significant coefficients on real variables (e.g., Bénassy-Quéré et al. 2004) implies that these also have a significant influence on the equilibrium positions.

One of the reasons for being dissatisfied with the requirement of steady state as an equilibrium condition is that it limits one to thinking of equilibrium as something that will hold only in the very

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3. This is a necessary condition for present values to be finite in a model where there is a unique interest rate that applies to lenders and borrowers. It is possible for the pure rate of time preference to be lower, but this needs to be supplemented so that gross interest rates exceed the growth rate. The classic approach adds the rate of growth of consumption multiplied by the marginal utility of income (Ramsey 1928). An alternative is to add a probability of death for lenders and a risk premium for borrowers (Meredith 2007).

4. If transport costs and trade impediments for all goods were zero and the composition of consumption was the same everywhere, PPP would be a consequence of perfect arbitrage. Conversely, the existence of transport costs (which are practically infinite in the case of nontraded goods) and differences in consumption patterns mean that absolute PPP (equality of the price levels in different countries, after multiplying by the exchange rate) is a nontrivial hypothesis, which holds only if the purchasing power of a unit of money converted by the prevailing exchange rate is the same everywhere. Empirically, the hypothesis has not fared well. Relative PPP (equality of inflation rates, so leaving initial relative prices unchanged) has fared much better, at least as an equilibrium condition (Rogoff 1996).

long run, once the process of development is complete. Many economists have preferred to consider equilibrium as a situation in which NIIP/GDP is changing although everything else is in steady state. This preference then raises the question of how one expects NIIP/GDP to vary as development proceeds. A traditional answer was given by the theory of the debt cycle (see, for example, Kindleberger 1958, 417). A country newly opened to the outside world would lack modern technology and have a low capital stock per person, so one would expect it to borrow. Its equilibrium payments position would involve a current account deficit and an inward transfer of real resources, as a result of which it would gradually build up debt service payments (Stage I of the debt cycle). In due course the inward transfer would cease, but there would still be a current account deficit as debt service payments exceeded the trade surplus and so the NIIP/GDP would go on becoming more negative (Stage II). An impatient country could reach long-run equilibrium (a steady state) in this condition, with the NIIP/GDP reaching a limit and ceasing to grow further: The current account deficit as a proportion of GDP would equal the debt-income ratio times the growth rate. In contrast, a patient country would undergo further stages of the debt cycle. In the first instance it would move into current account surplus as the trade surplus came to exceed debt service, and hence NIIP/GDP would start to decline (Stage III). Eventually NIIP, and hence debt-service payments, would become positive (Stage IV). The steady state of a "mature creditor" is marked by NIIP/GDP stabilizing at a positive value, with a negative trade balance more than offset by receipts of debt service (Stage V). (A sixth stage of the debt cycle, with a negative current account that would ultimately lead back to Stage I, is explicable only if one of the parameters of the model—such as the rate of time preference or the productivity of capital—were to change.)

However, the bulk of economic theorizing has focused on the shorter run, on explaining the transition to long-run equilibrium,[5] rather than on the characteristics of the long-run equilibrium. The most famous class of models here is that which assumes perfect capital mobility, which implies that the market must expect equalization of the rate of return from holding different currencies, i.e., that the interest differential must be equal to the expected rate of change of one currency in terms of the other. This condition is usually referred to as uncovered interest parity.[6] Alternatively, since under rational expectations and perfect capital mobility the forward exchange rate must be equal to the expected future spot exchange rate, the forward discount or premium must be equal to the interest differential. (In steady-state equilibrium, of course, expected real interest rates must be equal on all currencies.) Thus interest differentials will trace out the expected path of adjustment to equilibrium. (The central role of interest

5. A good source for standard exchange rate economics is Isard (1995).

6. It is sometimes referred to simply as the interest parity condition, though this usage runs the risk of confusion with covered interest parity, which is always true in a well-functioning financial system. Covered interest parity is the proposition that the interest differential is equal to the forward premium or discount. Failure of covered interest parity would allow riskless profits to be made by arbitraging between two currencies. In contrast, engaging in arbitrage that is not covered involves taking a speculative risk and yields a profit only if expectations are basically correct.

differentials in driving exchange rate movements was first developed by John Maynard Keynes in the years following the First World War, the first modern period of widespread floating exchange rates. The main post–Second World War work on floating exchange rates, prior to the adoption of generalized floating, involved development of the Mundell-Fleming model by Fleming [1962] and Mundell [1964].)

The big novel step in understanding the role of monetary factors in driving the short-run behavior of floating exchange rates, taken shortly after the adoption of generalized floating in 1973, was made by Rudiger Dornbusch (1976) in his overshooting model. He was among those who emphasized that the exchange rate had to be viewed as an asset price, whose value would be determined in the asset markets at a level that would induce holders to willingly hold the outstanding stock of a currency. An unexpected increase in the stock of a given currency would induce a fall in the own currency rate of interest for traditional reasons, but in order to persuade investors to hold the increased stock of local currency, it would be necessary for the expected yield to continue to be equal to the unchanged world rate of interest. This condition would be possible only if the currency were in the future expected to *appreciate* until equilibrium was restored. Such appreciation was in turn possible only if the currency underwent an initial instantaneous depreciation beyond that which would have reestablished the initial money/income ratio (which must be reestablished in the final equilibrium). This was the famous "overshooting."

An important alternative came from abandoning the assumption of perfect capital mobility (Kouri 1976). The alternative approach was developed simultaneously on the hypothesis that different currencies are imperfect substitutes. Suppose once again that there is a sudden unexpected increase in the supply of a particular currency. Once again, one knows that the new equilibrium will involve a depreciation proportionate to the increase in the money supply. But in the short run the increased supply had to arise from some source, say intervention in the currency markets. If the initial position was one of full equilibrium, then immediately afterwards investors would have too many domestic assets and too few foreign assets in their portfolios to be consistent with equilibrium. So there would be a depreciation of the domestic currency, which might or might not involve overshooting, but which in either event would create a current account surplus that would rebuild foreign assets toward their initial equilibrium level. Equilibrium would be restored when the real value of domestic assets had been eroded by inflation to its previous level and the real value of foreign assets had been rebuilt by current account surpluses.

Perhaps the most famous succinct description of exchange rate models was that provided by Richard Meese and Kenneth Rogoff (1983) in their famous dismissal of the empirical relevance in the short run of all the existing models. The quasi-reduced form specifications of all the models they examined are subsumed in the specification:

$$s = a_o + a_1(m\text{-}m^*) + a_2(y\text{-}y^*) + a_3(r_s\text{-}r_s^*) + a_4(\pi^e\text{-}\pi^{e*}) + a_5\Sigma TB + a_6\Sigma TB^* + u$$

where

s = logarithm of dollar price of foreign currency

$m-m^*$ = log of ratio of US money supply to foreign money supply

$y-y^*$ = log of ratio of US to foreign real income

$r_s-r_s^*$ = short-term interest differential

$\pi^e-\pi^{e*}$ = expected long-run inflation differential

ΣTB = cumulative US trade balance

ΣTB^* = cumulative foreign trade balance

u = disturbance term.

All the models they consider, which aim to explain the bilateral exchange rate between the United States and a single other country which implicitly must strictly cover the rest of the world, posit $a_1 = 1$, i.e., first-degree homogeneity in relative money supplies. The monetary models of Jacob Frenkel (1976) and John Bilson (1978), which assume PPP in the short run, was interpreted as implying $a_4 = a_5 = a_6 = 0$. The Dornbusch (1976) overshooting model and Frenkel's application of that model to the deutsche mark (Frenkel 1979) were interpreted as still implying perfect capital mobility and therefore $a_5 = a_6 = 0$, but allowing for changes in the real exchange rate since prices were recognized as sticky. None of the coefficients in the equation was constrained to be zero in the model of Hooper and Morton (1982). If asset positions mattered for exchange rates as hypothesized by the portfolio models just discussed, then one would expect a_5 and a_6 to be significantly different from zero.

The gist of the Meese/Rogoff paper is that a random walk outperformed all of the exchange rate models considered at short time horizons (up to a year). The next section extensively refers to this important result. However, the immediate interest is in the paper's choice of exchange rate models that were felt to be sufficiently important to criticize. These are the two models already discussed plus the monetary model that assumed short-run PPP (see Frenkel 1976). Empirical evidence had already overwhelmingly rejected the monetary model with continuous PPP as a short-run model of exchange rate behavior, so the real interest of the Meese/Rogoff paper was in showing the short-run failure of the other two models.

Some of the literature rejects the intuitive way of dividing the issues into long-run equilibrium and a short-run approach to equilibrium. It instead adopts the purist view that exchange rates can only be understood by a forecast through all future time and pins down the exchange rate by imposing a transversality condition[7] that rules out ever-larger deviations from PPP (which is an indirect way of

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7. A transversality condition requires convergence in the long run, so as to rule out Ponzi games being chosen in the optimal solution. (If one assumes that players will always play by the rules of the game, the outcome of a Ponzi game always dominates over any finite time horizon, though one knows that it must eventually blow up. A transversality condition excludes "solutions" that are not indefinitely feasible.)

introducing the current account). For example, a recent paper (Barrell et al. 2007) describing a now-conventional macroeconometric model (NiGEM of the National Institute of Economic and Social Research in London) states:

> It is usual to presume that agents in the foreign exchange markets look forward, and form expectations about interest rates and other events that may affect the evolution of the currency…. The arbitrage equation for the bilateral exchange rate e_t may be written as
>
> $$e_t = e_{t+1}(1 + rf_t)/(1 + rh_t)(1 + rp_t)$$
>
> where rh_t is the interest rate at home, rf_t is the interest rate in the partner country, and rp_t is a risk premium. [It is implicitly being assumed here that the home country is more risky than the partner country.] Exchange rates change because one or more of these factors change.

In terms of the models just presented, the Dornbusch model assumes perfect capital mobility and therefore posits $rp_t = 0$, whereas a portfolio model posits a nonzero value of the risk premium. Portfolio models also normally hypothesize that the risk premium rises as indebtedness increases.

PROBLEMS WITH THE STANDARD MODEL

The conventional models summarized above have several empirical implications. In the first place, they are based on the assumption that exchange rates respond systematically to changes in "the fundamentals." Conversely, they predict that the exchange rate will not change if there is no "news" to motivate a change. Just what variables may be considered fundamental depends upon the particular model, but the Meese/Rogoff study would suggest that money supplies and income levels would qualify under all models, and that interest rates, expected inflation rates, and trade balances would qualify under some models. Relaxation of the assumption of perfect foresight would lead most analysts to wish to add also the terms of trade and productivity, insofar as current values of those variables change perceptions of their "permanent" values. On the other hand, the lagged value of exchange rate changes ought not to be capable of forecasting future exchange rate changes.

A second implication of the standard models is that money is to be made by having a good notion of what the fundamentals point to, and predicting future exchange rates on that basis. In contrast, chartist rules—which essentially amount to extrapolating past trends in the exchange rate—would lose money. The most famous, and early, enunciation of this principle was by Milton Friedman (1953). The conventional model denies the possibility of "bubble-and-crash" dynamics, in which the exchange rate is carried further and further from its fundamental value by market dynamics, until at some point it returns relatively rapidly to the vicinity of equilibrium.

All these implications of the received theory strongly counter empirical evidence. The first was most famously challenged by the Meese/Rogoff study, although there are also other studies with a consistent conclusion. Many years later their finding still represents the overwhelming conclusion of students of the field, although Gourinchas and Rey (2005) show that adding the exchange rate induced change in wealth to the current account outcome permits a degree of short-run forecastability of the exchange rate. De Grauwe and Grimaldi (2006, 4) contrast the rollercoaster of the exchange rate between the dollar and the deutsche mark/euro over 1993–2003 with the minimal variation of the rate that might have been expected on the basis of changes in the obvious fundamentals. (No one has ever made an analogous contrast between the gyrations of exchange rates following the first oil shock and the modest changes in exchange rates among the industrial countries that were needed to facilitate adjustment to the oil shock. But the literature has often claimed that floating was indispensable to adjustment to the oil shock.)

Most firms that actively trade foreign exchange use chartist models—not necessarily exclusively, though some seem to do that, but they are certainly among the tools routinely employed. Most of them do not lose money but have concluded that chartist models enable them to enhance their market performance. This would not be possible if exchange rates were correctly predicted by the profession's standard model.

Exchange rates have frequently been involved in something that looks a lot like bubble-and-crash dynamics: the slow appreciation of the dollar in 1980–85 and its collapse in 1985–87; the similar pattern of the dollar leading up to its peak in 2001–02; the pound's appreciation following the accession of Margaret Thatcher to power and its rapid collapse after Alan Walters was appointed her economic adviser and had lunch in the City;[8] the yen's ascent to a peak in March 1995; and so on.

The conclusion is inescapable: The conventional exchange rate model is an empirical failure. It is, however, a commonplace observation that theories are not displaced by empirical results, but only by the availability of a superior theory. De Grauwe and Grimaldi offer a theory that is intended to replace the conventional model, which they call a behavioral theory. It is more solidly grounded in the behavioral finance literature than its predecessors, but in essence has the same structure as that explored by several other authors, originally Frankel and Froot (1986).[9] That is, the foreign exchange market is populated by agents who use two types of rules for forecasting exchange rates: fundamentalist and chartist. The fundamentalist rule is used by people like us who believe that, absent special factors, exchange rates will tend to revert to their long-run equilibrium level. They (we) forecast exchange rates on the basis of

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8. Alan Walters is reputed to have stated an obvious fact: that the pound was overvalued. But hearing this stated by someone with a strong monetarist reputation and Margaret Thatcher's ear was enough to persuade "the market" to start ending the overvaluation.

9. In Shleifer and Summers (1990) chartists are replaced by "noise traders," whose modus operandi is less well specified, but the model also depends on their interaction with arbitrageurs, who are similar to "fundamentalists" though they are limited in their operations because these involve incurring risks.

rational expectations, efficient markets (REEM) models.[10] Chartists are people who extrapolate recent exchange rate changes into the longer-term future. Their actions tend to reinforce recent changes in exchange rates. At any one time a particular actor in the foreign exchange market tends to behave as either a fundamentalist or a chartist, but he or she may revise the principle used to forecast exchange rates if they find that the alternative behavior has recently been more profitable. They choose between these two rules not because of a conviction that this results in actions that are perfectly rational, but because they are "boundedly rational," i.e., unable to understand the world in its full complexity but instead forced to resort to imperfect but comprehensible rules of thumb. They are rational in the sense that they discard a rule that is serving them badly.

The model of De Grauwe and Grimaldi is based on heterogeneous traders. Similar results can be generated by incorporating heterogeneous private information into a model (Bacchetta and van Wincoop 2006). This can also generate a large "disconnect" between changes in the fundamentals and changes in the observed market prices. In such a model higher-order expectations (Keynes's famous "beauty contest") matter.

Even without introducing the complication of heterogeneous information, De Grauwe and Grimaldi are unable to solve their model analytically. Instead they simulate the model several thousand times in order to establish its properties. Their main findings are:

1. Exchange rate changes are usually disconnected from changes in the fundamentals, although the exchange rate *is* cointegrated with its fundamental value.
2. If one sticks to one rule at all times, then a chartist rule tends to be more profitable than a fundamentalist rule. (It is often better still to switch between these rules.)
3. Exchange rate changes have fat tails (meaning that low-probability events happen much more frequently than they would if outcomes were distributed according to a normal distribution.)[11]
4. The exchange rate is sometimes, but unpredictably, disconnected from its fundamental value and instead involved in bubble-and-crash dynamics.

In other words, the model is consistent with the main facts about exchange rate markets, including those that should cause acute embarrassment to those who still adhere to the profession's mainstream model.

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10. And we are right, in a sufficiently long run, but that turns out not to imply that we will make more money.

11. The financial crisis of 2007 has caused much more distress to hedge fund managers than it would have done in the absence of fat tails to many financial variables.

DEVELOPMENT STRATEGY AND DUTCH DISEASE

Dutch disease obtained its name from an observation of what happened in the Netherlands following the discovery and large-scale export of natural gas in the 1970s. The export of natural gas served to enrich the inhabitants of Holland, which led them to import more and export less of goods other than natural gas. The mechanism that induced them to export less was an appreciation of the real exchange rate. The harm to the manufacturing export sector caused by a real appreciation due to abundant export earnings of some raw material thus became known as Dutch disease.

Economists have ever since debated whether Dutch disease should be considered a dangerous condition to be avoided by policy measures wherever possible, or a stroke of good fortune that should be enjoyed rather than resisted. The former view is largely based on the parable of export-led growth having led to beneficial development in East Asia. One of the essential conditions for the success of that strategy has always been described as the maintenance of a competitive exchange rate. Booming exports of a raw material that caused a real appreciation would interrupt that process and (it was argued) would thus scupper the process of development.[12] A country that develops successfully has in due course more chance of giving a good living standard to its whole population than most countries can hope to sustain on the basis of raw material exports.[13] Maintaining a competitive exchange rate in the presence of a booming raw material-exporting sector is thus regarded as a prudent act of investment. Most Latin American countries failed to keep their exchange rates competitive when capital inflows became available in the 1990s, as a result of which the import increase that resulted from trade liberalization was not accompanied by a development of export industries. Africa also showed little concern to maintain competitive exchange rates.

The view that development can be promoted by keeping the exchange rate undervalued raises two issues. One, considered later, is whether and how that can be accomplished. The other is the mechanism through which a highly competitive exchange rate works its effects.[14] A very old theory points to the benefits of nurturing infant industries, but the counters to that theory are also well established. More modern authors have suggested there are particular virtues in export industries, because they embody learning-by-doing, or have to face competition on the world market, or tend to exhibit characteristics of technological dynamism. However, econometric attempts to identify such benefits of export industries have not been compelling. It has also been argued that undervaluation tends to raise saving, although the contrary view would be that the current account deficit induced by an overvalued rate provides

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12. Dutch disease can also be caused by excessive capital inflows, or too much aid.

13. Note that the proposition refers to "most" countries, the exceptions being those with small populations relative to the value of their natural resources. For example, forecasts suggest that the citizens of Kuwait and Abu Dhabi will be able to live very comfortably for all future time from their oil and the rents they will earn from investing a large part of the proceeds.

14. This issue is discussed inter alia in Barry Eichengreen's (2007) paper written for the Growth Commission.

foreign saving to finance higher investment. A new paper of Dani Rodrik (2007) argues that the benefit stems not from avoiding Dutch disease per se, but from raising the relative price of tradables in terms of nontradables and in that way either compensating for institutional difficulties of contracting in the tradable sector or mitigating externalities. Another view (which I tend to share) holds that the principal benefits of a strategy of export-led growth are macroeconomic: avoidance of an acceleration of growth being self-defeating because of the threat of a payments crisis. This view suggests that Dutch disease is problematic if it is induced by a boom that turns out to be unsustainable but that maintaining a permanently much undervalued rate would be pointless even if it were feasible. Most of those who worry about Dutch disease would assert that even if the mechanism is still ill understood, the empirical consequences are clear.

However, an alternative view is more prevalent among economists.[15] This view is that an increase in the value of raw material exports is just like any other increase in income: It enlarges the opportunity set available to domestic residents and should therefore be welcomed like any other improvement in the terms of trade (or indeed any improvement in productivity). Naturally an unexpected improvement will in general dictate some modification in the planned profile of development, and one expects that where the shock involves increased export earnings this will usually involve a curtailment in the size of the rest of the export sector. A real appreciation is the natural and efficient way to induce such a reduction in the size of the export industries, which is an inevitable consequence of the inward transfer of real resources that is needed to translate increased real income into higher consumption and living standards. And the standard professional view would be that the right way to bring about such a real appreciation is via a nominal appreciation, which a floating exchange rate would allow to occur. Most economists would also expect that in these circumstances a floating exchange rate would indeed appreciate.

Econometric, rather than just anecdotal, evidence to illuminate this question is beginning to become available. The first study to ask econometrically whether there was evidence that overvaluation damages growth was that of Razin and Collins (1999). Defining the equilibrium real exchange rate[16] as that which would obtain if all prices were completely flexible, they concluded that there was indeed empirical evidence of a negative relationship between misalignment and growth. Prasad, Rajan, and Subramanian (2006) also concluded that there is empirical evidence that overvaluation harms growth in developing economies, although they find no evidence that the same is true in developed countries.

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15. A good exposition of the standard view is provided by Corden (2002).

16. There are two definitions of the real exchange rate in the literature (in addition to the trivial Latin American versus Anglo-Saxon issue of which way one expresses an exchange rate). One definition, stemming from the analysis of industrial countries and used in IMF publications, refers to the relative price of two national outputs, $q_A/p_A \div q_B/p_B$. The alternative definition, which stems for the analysis of primary producing countries and is widely used in particular in Latin America, is the relative price of tradables to the price of nontradables, p_T/p_{NT}. Empirically the two move sufficiently closely together that the choice between them is not a big issue in the short run, although different trends in the productivity of tradable versus nontradable industries can lead to important divergences in the longer term.

Rodrik (2007) and Bhalla (2007) agree that the evidence shows that growth is dependent on avoiding an overvalued exchange rate, but they also argue that undervaluation is helpful to growth. The most careful study of this issue is that of Aguirre and Calderón (2006). Defining the equilibrium real exchange rate from a cross-country regression with net foreign assets, productivity, terms of trade, and government spending as independent variables, they include misalignment in a standard cross-country growth regression. This study displays the usual results with respect to conditional convergence, the initial output gap, education, depth of financial markets, terms of trade, inflation, and currency crises. Using several different measures of misalignment, they conclude that there is a negative and significant relationship between growth and misalignment on all the measures of the latter. However, this result is driven primarily by large misalignments: Indeed, the very best policy (in terms of maximizing growth) appears to be a *small* undervaluation.

One particularly interesting empirical result of Aguirre and Calderón (2006, 20–21) is that a given change in the real exchange rate may have a differential effect on growth depending on whether or not it is an equilibrium phenomenon. If the real exchange rate were to appreciate by 10 percent as a result of better (permanent) terms of trade, their results imply that the growth rate would be expected to increase. But if the same appreciation occurred because the government tied the nominal exchange rate to that of some trading partner to provide the economy with a nominal anchor but inflation did not come to an abrupt halt, or the anchor currency appreciated relative to those of the country's other trading partners, then the exchange rate would become misaligned and growth would be expected to decline. What could rationalize this differential response? Presumably a different judgment by the private sector of the permanence of the change. If the equilibrium exchange rate appreciated, entrepreneurs could expect to sell nontradables indefinitely into a richer economy to counter the reduced profitability of producing tradable goods. While the profitability of investing in the exportable sector might still decrease just as would happen with an appreciation that represented a misalignment, this would be offset by the increased profitability of investing in the nontradable sector. Moreover, there would be no reason for them to anticipate a crisis. In contrast, when appreciation causes a misalignment, the resulting price change is likely to be reversed and is therefore unlikely to induce much increased investment in nontradables. But because entrepreneurs cannot be confident of when the price change will be reversed, they may not wish to invest so much in exports either, because some projects would only be economic at the equilibrium exchange rate. On top of this is the danger that the policies being pursued will lead to crisis. (Note that this difference is consistent with the macroeconomic explanation for the success of export-led growth that was mentioned above.)

Suppose one takes this as evidence for believing that Dutch disease is indeed capable of reducing growth. What can policy do about it?

The conventional view is that policy is not capable of doing a lot. Most exchange rates now float, which means that they are not a policy weapon. It is not even clear that the authorities can do a great deal to influence the real exchange rate in countries that are not floating their exchange rate, because price levels tend to move in order to offset changes in the nominal exchange rate.

How convincing is the standard view? Consider the case of a floating exchange rate. Is it really true that the exchange rate is impervious to policy measures? Suppose that the exchange rate has become abnormally strong as a result of a temporary improvement in the terms of trade or capital inflows. The standard theory gives little scope for intervention to have much effect: It argues that intervention can work only by predicting future changes in monetary policy ("the signaling channel"), or by changing the relative supplies of different assets ("the portfolio channel"), and that both of these channels are rather weak. In contrast, the behavioral theory argues that a systematic intervention policy can increase the rewards of using a fundamentalist trading strategy and in that way increase the weight of fundamentalists in the market. This makes it a potentially more potent instrument for avoiding the large misalignments that are caused by chartists jumping on bandwagons.

If a strengthening of the exchange rate is caused by a permanent change, then it will appreciate the long-run equilibrium exchange rate. The Aguirre-Calderón result is that this does not need to cause concern. Dutch disease is a concern only when the strengthening of the real exchange rate is temporary.

Unfortunately that may still leave a large number of cases in which the authorities are at least initially quite uncertain as to whether a strengthening of the real exchange rate is to be regarded as permanent or temporary. The difficult question is what to do in such cases. If the authorities treat such a shock as temporary and it turns out to be permanent, they will waste a great deal of public money and delay a desirable adjustment of the economy. If they treat it as permanent and it is subsequently reversed, then the cost will be a reduction in the growth rate. It would be desirable to have some other policy instrument that could be deployed in order to limit the costly purchase of reserves while avoiding an appreciation of the real exchange rate that may need to be reversed in due course.

The most convincing recent justification for capital controls is based on the belief that they provide such an instrument. This was quite clearly the purpose of the *encaje* used in Chile in the 1990s. The *encaje* was a requirement that 30 percent of the value of a nonequity capital inflow should be deposited in a noninterest bearing account in the Central Bank for a year irrespective of the maturity of the asset bought with the inflow. (An alternative way of meeting the obligation was to pay a tax with a similar present value at the time of the inflow.) There has been an extensive literature, mainly in Chile, discussing whether the *encaje* was effective in reducing the capital inflow or increasing the monetary independence of the Chilean authorities (it is widely, though not universally, conceded that it was effective in lengthening the maturity of Chile's foreign debt). Much of this literature dismisses the *encaje* as ineffective. In my view this suffers

from the fundamental problem of failing to recognize that a given *encaje* can be used by the authorities either to increase the domestic interest rate, or to reduce the capital inflow, or some combination of the two, but that to the extent that it fulfills one purpose it is unavailable for the other. Only if the authorities had always chosen to use their increased freedom in much the same way should one expect a regression equation with the *encaje* as an independent variable to show a significant coefficient in a capital flow or interest rate equation. The absence of significant coefficients is compatible with the authorities having used their increased freedom in different ways at different times as well as their not having any increased freedom (which was the interpretation of the critics).

Many countries have employed one form or another of capital controls, at least since the First World War. At the time of Bretton Woods it was taken for granted that the normal situation for most countries would be one in which capital controls would be imposed. At the time no one doubted that capital controls were effective, but such doubts did arise in later years. However, a paper by Richard Cooper (1999) assembled strong evidence that the capital controls used by developed countries had remained effective until they were abolished—a process that started gradually in the 1960s and sped up after Margaret Thatcher came to power in Britain in 1979, and was essentially completed when the European Union moved to the second stage of monetary union in 1990. Nowadays no developed country maintains more than remnant capital controls, nor is there any pressure to reintroduce them.

No such linear story can be told of developing countries. In general there was a period when controls were tightened, in the first decade or two of independence, or in the 1960s and 1970s in the case of Latin America. But subsequently events have followed very different courses in different countries. A few (like Hong Kong) moved all the way to capital account liberalization and have stayed there. Some countries (like Argentina) have yo-yoed between total liberalism and Draconian controls. Others (like Chile, Colombia, Malaysia, and Thailand) have imposed specific controls at particular times. Several countries (like China and India, and perhaps Brazil) have maintained controls at all times, though with a trend toward liberalization. Others liberalized (most in the early 1990s, when there was an international atmosphere that favored liberalization) at one time and then tightened or reimposed controls subsequently, in several cases when international opinion changed after the Asian crisis.

In Latin America, there was considerable liberalization after the debt crisis had been overcome. Among the major countries, Argentina, Mexico, Peru, and Venezuela all liberalized in the first half of the 1990s. In contrast, Chile and Colombia both tried to limit inflows by imposing an *encaje*, as recounted for Chile above. There has been less debate about Colombia, but my own judgment is that in both these cases the controls were reasonably effective. Brazil also tried to limit inflows, but its efforts have generally not been judged a success. The usual opinion seems to be that the regulations were excessively complex and changed too frequently to permit efficient enforcement in view of the sophistication of the Brazilian financial markets.

Many Asian countries have also had capital control regimes that appear to have been effective. Even in the case of Singapore, which is often counted as highly liberal, the Monetary Authority of Singapore had the right to prohibit foreign borrowing of Singapore dollars in order to speculate at the time of the Asian crisis in 1997. (It abandoned that ability as one of the prices for the bilateral free trade agreement with the United States in 2003.) China and India have only undertaken very gradual liberalization, and still have administrative controls covering most types of payments and receipts (though both allow unimpeded servicing of foreign investments undertaken legally). Indonesia liberalized early on (1973), much earlier than most experts regarded as prudent, but ran into problems only in the Asian crisis in 1997. Malaysia and Thailand both have an interesting history, of having liberalized but then imposed controls in order to try and limit capital inflows (and, in the case of Malaysia, also outflows). Korea came under strong international pressure to liberalize as part of the process of entering the Organization for Economic Cooperation and Development (OECD) in the mid-1990s, and made the fatal mistake of responding by liberalizing short-term but not long-term capital flows. It is primarily on the basis of the Asian experience in the 1990s that many analysts attributed the Asian crisis to capital account liberalization: It is a fact that there is a close correspondence between the Asian countries that suffered a crisis and those that allowed unfettered capital flows (or at least unfettered short-term flows) in the preceding period.

What other instruments might be capable of limiting an unwanted appreciation of the real exchange rate in good times? One needs to distinguish between an appreciation caused by current account receipts and capital inflows that may be temporary. Abnormally large current account receipts are appropriately held outside the country. If the presumption is that they will be reversed over the business cycle, a stabilization fund—managed in a similar way to official reserves, although the assets need not be as liquid as reserve assets traditionally have been—will be the appropriate medium. However, there are some countries—like Norway and Kuwait—that clearly wish to avoid spending all of their current account receipts over the cycle. The solution in such cases involves creation of a sovereign wealth fund, again to be held outside the country. Some rule—such as the Norwegian rule which says that the current generation can spend the real income generated by the endowment—is needed to determine the level of income that can be spent, presumably by being paid to the government. The rest is held in long-term assets outside the country, and provided the market does not expect those assets to be raided by the government they will have no impact on the level of the exchange rate. There may, however, be particular difficulties in avoiding Dutch disease from aid receipts, insofar as they are unlikely to continue arriving if a recipient begins to lock up the proceeds in a sovereign wealth fund. Perhaps the best solution is to design a particular program that uses the entire aid proceeds to buy imported goods, since this arrangement avoids an increase in aid leading to Dutch disease (which is bound to happen if a part of the aid is used to defray local costs).

Suppose next that the problem is caused by capital inflows that may prove temporary. There are several useful measures that may have the effect of discouraging capital inflows, like requiring banks to hold matched currency positions and requiring higher reserves against foreign currency loans that banks extend to the nontraded sector. However, these are measures that should be implemented irrespective of the state of the cycle, in order to ensure that capital-importing countries do not suffer from the currency mismatch problem. One hardly wants to see countries varying such regulations in order to influence the capital inflow in a stabilizing way over the course of the business cycle. The real alternatives to the *encaje* in influencing capital flows in a cyclically stabilizing way are fiscal.

Chile employed one possibility in the 1990s: It imposed a tax levied on the size of a capital inflow as an alternative to the *encaje*. This tax could have replaced the *encaje* rather than being offered as an alternative. Another possibility is to impose a differential tax (a surcharge) on interest income earned by a nonresident. This proposal also has a historical precedent: Switzerland imposed a differential tax in the dying days of the Bretton Woods system in order to discourage unwanted capital inflows. It proved ineffective, which is hardly surprising, for correct speculation on a step parity change offered far greater rewards than could be offset by loss of a month or two's interest payments. Surprisingly perhaps—for its imposition does not seem to be administratively particularly difficult[17]—there has been no discussion of this proposal in recent years. It could be far more effective in the present environment of managed floating than it was under the adjustable peg.

POLICY IMPLICATIONS

What are the policy implications—regarding both the choice of an exchange rate regime and how one operates a regime—if one accepts that exchange rates are determined by the behavioral finance model of De Grauwe and Grimaldi rather than by the profession's standard theory?

I do not see any implications regarding the decision to adopt a (really) fixed exchange rate. It remains true that a fixed nominal bilateral exchange rate is a good idea only under some rather special conditions. I see no reason to change those from the list that I offered many years ago (Williamson 1991, 395–96):

1. The economy is small and open, so that it satisfies the conditions for being absorbed in a larger currency area according to the traditional literature on optimum currency areas.
2. The bulk of its trade is undertaken with the trading partner(s) to whose currency…it plans to peg.
3. The country wishes to pursue a macroeconomic policy that will result in an inflation rate consistent with that in the country…to whose currency…it plans to peg.

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17. Some domestic resident has to be indebted to a foreigner when money has been lent internationally. It would be his responsibility to pay the tax surcharge.

4. The country is prepared to adopt institutional arrangements that will assure continued credibility of the fixed rate commitment. This may best be established by replacement of a central bank…with a currency board.

The implications come in whether to adopt a policy of relatively free floating. The standard model suggests that this is a good idea: The rate will normally be reasonably close to its fundamental value (or at least closer than it would be if it were managed by the government), and anyway there is not much the authorities can do about it. The behavioral model challenges both parts of that proposition. It concludes that speculative runs can cause lengthy misalignments and also that systematic intervention policy can address misalignments.

Note, however, that the presence of many traders who use fundamentalist principles implies that it would still be unwise to adopt a regime that relies on regularly fooling the market, like the system of "stable but adjustable exchange rates." There is nothing in the theory to suggest that this would not result in the regular foreign exchange crises that we witnessed under the Bretton Woods system, or in 1992–93 within the narrow-band European Monetary System (EMS), or in numerous developing countries that have continued to manage their exchange rates under the adjustable peg. It is no good imagining that the ills of this system could be avoided by a resolve to change the exchange rate more rapidly when conditions indicate that a change is needed. That might help the first time or two around, but the market would soon learn of the greater willingness to change the exchange rate quickly, and would react by starting speculation sooner. It is precisely efforts to avoid exchange rate changes that may prove ill-advised that have motivated past declarations that the exchange rate is not going to be changed, and abandonment of such efforts will result in exchange rate changes that can be seen with the benefit of hindsight to have been erroneous. The best we can hope to do is to limit the size and duration of the resulting misalignments.

There is still a choice between managed and unmanaged floating, and various forms of intermediate regime, all of which are variants of the BBC[18] regime in which the first B or the C is absent.[19] A fundamental decision is whether to publish some exchange rate(s) that will limit the fluctuations that will be tolerated. The principal argument in favor of announcing such hard margins is that a credible margin would result in gaining the help of the speculators in limiting flexibility,[20] although it would also have the effect of constraining the freedom of government. Views differ sharply on whether this is a benefit or a cost. However, it appears that nowadays the authorities have no credibility when they make exchange rate

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18. In this context BBC stands for basket (the parity is expressed in terms of a basket of currencies rather than a single currency), band (the exchange rate is allowed to fluctuate in some band around parity), and crawl (parity changes are effected in a series of small steps rather than occasional discrete jumps).

19. The second B—band—is fundamental, or else the regime becomes one of managed floating.

20. See Krugman (1991) for the canonical paper that developed the argument.

commitments, which destroys the main argument for announcing a band. The choice is then reduced to one of managed versus unmanaged floating.

The very language that is used betrays the fact that the policy preferred by officialdom is unmanaged floating, since this is customarily referred to as "clean floating." Management is "dirty." Countries that acquire a lot of reserves are "manipulating" their exchange rate, which is forbidden behavior. There is no evidence that presenting the options in such a biased way is essential to establishing the credibility of central banks as inflation fighters. Central banks will acquire that reputation if they deserve it and will not acquire it if they tolerate inflation, no matter what rhetoric they use to denounce practices that are not in fact inconsistent with targeting inflation.

One could understand the logic of making laissez-faire an ideal, as this does, if exchange rates behaved as portrayed in the standard model. But this is where one needs to take account of the compelling evidence that this model is not a valid description of behavior. A comparison with managed exchange rates is indispensable. The problem is that there is no accepted definition of how exchange rates might be managed. The management that has occurred in practice is ad hoc, at times seeking to avoid what are regarded as particularly disturbing situations, and at other times intervening to hold a rate that is not publicly announced, but with no public enunciation of the ends being sought. Academic attempts to define management have suggested two principles:

(a)   *Leaning Against the Wind*: Intervention should always resist market moves, slowing the movement of the rate. (This was suggested by Paul Wonnacott [1958].)

(b)   *Reference Rate Proposal*: Intervention should never push the exchange rate away from an internationally agreed reference rate. (This was first proposed by Ethier and Bloomfield [1975] and forms the subject matter of Williamson [2007].)

If one believes that the main disadvantage of current exchange rate arrangements is their propensity to generate misalignments, it is difficult to see great merit in the first proposal, which would prohibit reinforcing exchange rate moves that were tending to eliminate misalignments as well as those that were magnifying misalignments. However, it has to be said that De Grauwe and Grimaldi (2006, 159–62) find that intervention informed by this first principle would be effective in curbing misalignments. (They do not test for a pure version of the second principle. My conjecture is that this would be even more stabilizing.)

Adoption of the reference rate proposal would require international agreement on the set of exchange rates (presumably of real effective exchange rates) that were to serve as reference rates. They might be surrounded by a band within which all intervention was prohibited. Further away, intervention would be permitted (provided it was designed to push the rate in the appropriate direction) but it would never be required; this is after all a proposal for managed floating, and it would scarcely be consistent

with the idea of floating to require intervention. Other ways of managing the exchange rate (e.g., through altering the interest rate or changing capital controls) could be disciplined on the same principles as intervention (including "oral intervention," aka jawboning).

The big issue concerns the possibility of securing agreement on a set of reference rates. In part this is a political issue: Will countries be prepared to agree to central rates even though many of them assert—not unreasonably—that all they can identify are disequilibrium rates? The hope is that the absence of any obligations to keep the rate close to the central rate will make such agreement feasible. But in part it is also a technical issue. In a recent report on the methods it uses for identifying equilibrium exchange rates (IMF 2006), the Fund outlined three such methods, which it called the Macroeconomic Balance Approach, the Equilibrium Real Exchange Rate Approach, and the External Sustainability Approach. The External Sustainability Approach is essentially a variant on the Macroeconomic Balance Approach, in which macroeconomic balance is identified with a current account outcome that will maintain the existing NIIP/GDP ratio constant, rather than specifying a current account target ad hoc that is judged to reflect the underlying capital flow. But that leaves two indisputably different methods. If they tend to yield similar results, that will add significantly to confidence that there is no technical obstacle to securing agreement on a set of reference rates, and that the IMF possesses the technical tools to permit it to identify reasonably accurately "right rates." Unfortunately the IMF at present publishes only the methodological analyses that underlie its work, and hence one is unable to judge whether or not there is a major technical obstacle.

If agreement on a set of reference rates were achieved, this could still mean that the only obligation of each country would be not to intervene, or otherwise manage its exchange rate, in a way that would push the rate away from the agreed reference rate. The system would still be one of floating exchange rates in the sense that countries have no obligation to hold the rate at any particular level. There would therefore be no conflict with such features of the contemporary world as inflation targeting.[21] But the fact that there would be a published set of rates that had received international endorsement would give the private market a sense of what the official world believed equilibrium to be, and where it expected rates to go in the medium term, and would provide a basis for public debate about the equilibrium exchange rate. Assuming that the agreed reference rate was not so appreciated as to inflict Dutch disease, it should be easier for a country to resist cyclical appreciation caused by a temporary export boom or capital inflow surge.

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21. Inflation targeting is now pursued by the overwhelming majority of countries that have adopted free floats and by an important minority of those with intermediate regimes. It has been adopted so widely because it seems to work. Critics who interpret it as prioritizing inflation control over output growth have made an analytical error, unless at least they still believe in a nonvertical Phillips curve even in the long run. A policy of inflation targeting in fact implies seeking to stimulate employment whenever unemployment rises above the nonaccelerating inflation rate of unemployment (NAIRU). Inflation targeting may thus be regarded as a contemporary version of seeking to secure "internal balance."

Note that while one can argue that this would lead to a better international monetary system, and would therefore be in the interest of the major countries, it also addresses the needs of the developing countries and emerging markets. It would not prevent them having a "fixed exchange rate" (by which is usually meant an adjustable peg), or a BBC regime, if they decide that is what they want, as long as the target is close to the reference rate. But the existence of an internationally endorsed target rate for their currencies (the reference rate) would make it easier for them to defend their exchange rate. It seems to be a fact that mutual intervention is much more effective than unilateral intervention (e.g., Frankel and Dominguez 1993), presumably because it shows that the authorities on both sides agree on the direction in which the rate should move. On the same logic one would expect that an agreed reference rate would aid the authorities in defending an announced target. And it would also offer countries that have concluded that capital mobility has become too great to permit them to operate with hard margins to have a regime which nevertheless avoided leaving the exchange rate completely to the tender mercies of the market.

In particular, it would make it easier to defend against overvaluation and the threat of Dutch disease. It would accomplish this not only by reinforcing the potency of what is sometimes referred to as "oral intervention," but also by encouraging the use of traditional market intervention in defined circumstances. There would be no question about the legality or propriety of intervention approved by the system, and one would therefore expect to witness more of it. Similarly it would define the circumstances in which other actions to influence exchange rates would be acceptable to the international community, and would therefore encourage their use in appropriate conditions.

There is an additional argument against floating (e.g., Calvo and Reinhart 2000). Some countries have a high degree of liability dollarization, which means that a significant depreciation is liable to greatly increase liabilities relative to assets. Irrespective of whether this shows up in banks, in the corporate sector, or in the public sector, it creates major problems for the economy. Governments seek to avoid these difficulties by avoiding devaluations. If a deflationary adjustment of internal prices were a realistic option, this would constitute an additional argument for preferring this course of action. But in most cases this is not practical, so that a refusal to devalue in effect means that adjustment does not occur. Postponing the inevitable is unlikely to be helpful.

The analysis in this paper has not affected the one robust generalization about optimal exchange rate regimes that it seems to be possible to draw. This is the proposition that because capital mobility increases with development it becomes increasingly necessary to accept a floating exchange rate as a country becomes richer. (Countries that satisfy the conditions for a fixed exchange rate are of course an exception: When all countries are developed, maybe the bipolarity thesis will be valid.) Developed countries float (or are part of a currency area); most emerging markets now have adopted floating too,

although managed floating is still common; many developing countries still have an adjustable peg. The main advice to them is not to make an immediate shift, but to make sure that they too move to floating before getting caught up in a speculative crisis. The fact that they can move to managed floating makes a change a lot easier to contemplate.

ADDITIONAL RESEARCH

The most obvious question sparked by the preceding survey is not one on which additional research is needed, but one where the work has already been done and the urgent need is for publication. Namely, it would be extremely useful in establishing the strength of the case for reference rates if the quantitative figures yielded by IMF research on equilibrium exchange rates were to be published. Comparison of the estimates yielded by the Macroeconomic Balance Approach and the Equilibrium Exchange Rate Approach would then be possible, which is not true at the moment. And this seems to be the natural next step in exploring the merits of the Reference Rate Proposal.

Since I do not regard exchange rates as being narrowly tied down by theory, I doubt the utility of investing resources in exchange rate modeling. Where the theory surveyed above strikes me as damagingly and unnecessarily weak is in identifying the nature of the dangers posed by Dutch disease. There is surely scope for additional constructive work in this area. But see Rodrik (2007) for an important recent start.

CONCLUDING REMARKS

Exchange rate economics took a big step forward in the 1970s, when the flow models of the foreign exchange market were replaced by models that recognized that the exchange rate is an asset price that depends on expectations of the future. But the profession has never taken the next step of replacing models in which everyone is assumed to believe they have a perfect understanding of how the system works (the REEM model) by one that recognizes diversity in agents' beliefs and thought processes. Such a model—De Grauwe and Grimaldi's behavioral finance model—exists. It has properties (unlike the standard model) that appear to be consistent with the main facts about foreign exchange markets. It is high time that this became the normal way for economists to think about the determination of exchange rates.

The alternative model has important implications about the way in which we think of exchange rate policy. Instead of the idealization of laissez-faire suggested by the standard model, it points to the possibility and value of managing exchange rates. This does not (in general) mean fixing exchange rates, or reverting to the adjustable peg, or abandoning inflation targeting or floating exchange rates. But it does

mean that the IMF should accept the duty of negotiating a set of reference exchange rates and enforce the obligation on member-countries to refrain from policies calculated to push rates away from them. While there could be no assurance that this would resolve all problems of Dutch disease that may threaten the possibility of export-led growth, it would at least help countries to avoid overvaluations that the official sector can see rest on temporary factors. That is perhaps the major contribution that exchange rate policy is able to make to the promotion of growth. It is not a panacea: But the evidence that overvaluation hurts development is now sufficiently strong to merit being reflected in policy, including delay to capital account liberalization where it appears likely to threaten overvaluation.

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