Working Paper No. 250

Explaining Long Term Exchange Rate Behavior in the United States and Japan

by

Anwar Shaikh
Department of Economics
Graduate Faculty
New School for Social Research
65 Fifth Avenue, NY, NY 10003
shaikh@newschool.edu

Rania Antonopoulos
General Studies Program
School of Continuing Education
New York University
antonpls@is3.nyu.edu

September 1998

A practical knowledge of exchange rates is of vital importance for economic policy in our increasingly interconnected world. Expectations about the consequences of NAFTA, the EEC, the causes and cures for trade deficits, the "appropriate" level of exchange rates at which policy should aim, and about the general consequences of macroeconomic policy -- these and many more issues depend heavily on an explanation of exchange rate behavior.

The difficulty is that the current models of the exchange rate perform quite poorly at an empirical level. This makes them an unreliable guide to economic policy. Conversely, in order to have a sound foundation for economic policy, one should operate from a theoretically grounded explanation of exchange rates which works well across a spectrum of developed and developing countries. The present paper applies the theoretical and empirical foundation developed in Shaikh (1980,1991,1995), which was previously applied to Spain, Mexico and Greece (Roman 1997, Ruiz-Napoles 1996, Antonopoulos 1997), to the explanation of the exchange rates of the United States and Japan.

Conventional exchange rate models are based on the fundamental hypothesis that, in the long run, real exchange rates will move in such a way as to make countries equally competitive. Thus they assume that in the long run trade between countries will be roughly balanced. In contrast, our framework implies that it is a country's competitive position, as measured by the real unit costs of its tradables, which determines its real exchange rate. This determination of real exchange rates through real unit costs allows one to explain why trade imbalances remain persistent. It also provides one with a policy rule-of-thumb for sustainable exchange rates. The aim is to show that one can construct a theoretically grounded, empirically robust, explanation of real exchange rate movements which can be of practical use to researchers and policy makers.

I. Problems with existing models of the exchange rate

1. The empirical failure of current exchange rate models.

The macroeconomic impact of foreign trade and of international capital flows has always been a matter of considerable importance in policy circles. With the sharp expansion of the global economy in the last two decades, this issue has become even more urgent. And since the movements of exchange rates play a critical role in this question, it is not surprising to find that an increasing amount of effort has been devoted to analyzing the determinants of real and nominal exchange rates. In his commentary on the field, Harvey (1996, p. 581) notes that "the literature on exchange rate determination is one of the largest in economics."

What *is* surprising, however, is that in recent years leading economists in this field have conceded that current

models of exchange rate movements simply do not work at an empirical level. This applies to a host of models derived from monetary or portfolio balance approaches, as well as models which adhere to Purchasing Power Parity and/or comparative advantage hypotheses (Harvey 1996; Stein 1995; Isard 1995, part II). For instance, in his survey of the field, Stein (1995, p.182) says that the poor empirical performance "of ... contemporary models ... shows why economists have been so disappointed in their ability to explain the determination of exchange rates and capital flows". Harvey's precis (1996, p. 567) is even more succinct: "neoclassical economists have expressed increasing frustration over their failure to explain exchange rate movements ... Despite the fact that this is one of the most well-researched fields in the discipline, not a single model or theory has tested well. The results have been so dismal that mainstream economists readily admit their failure". Yet, it is these very same failed models which "continue to be offered as the dominant explanation of ... exchange rate determination" (Stein, op. cit., p. 185).

2. Long run theories of exchange rates

Our own focus is on the long run behavior of the real exchange rate. Here, conventional theory consists of only two basic hypotheses (Isard 1995,p p. 127, 171-2): comparative advantage and Purchasing Power Parity (PPP). Neither one fares well at an empirical level.

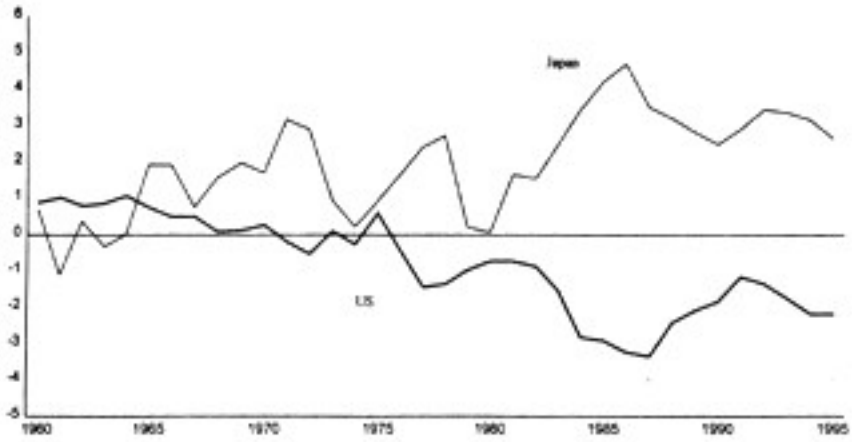
The most enduring hypothesis about the long run real exchange rate is that it moves to automatically balance the trade of each (freely) trading nation. From the time of Ricardo onward, this principle of comparative advantage has been *the* fundamental hypothesis of orthodox trade theory. And it remains in full force to this very day. For instance, Milberg (1994, p.224) notes that "the notion of comparative advantage continues to dominate thinking among economists". A nice illustration of this is Krugman's (1991) insistence that comparative advantage continues to operate in the modern world, and would automatically lead to balanced trade among nations if only it were given free rein. Even the theorists of the New International Economics school, who emphasize oligopoly, increasing returns to scale, and various strategic behaviors, begin from the premise that comparative advantage would hold in the absence of such "imperfections"(Milberg 1993, p.1).

As is well known, the comparative advantage hypothesis implies that automatic real exchange rate adjustments will ensure that "trade will be balanced so that the value of exports equals the value of imports" (Dernburg 1989, p.3). In contrast to the constant-real-exchange-rate of the PPP hypothesis (which we discuss next), comparative advantage generally implies that the real exchange rate will *vary* so as to ensure that trade remains balanced in the face of changing circumstances. If comparative advantage did indeed regulate international trade, it would make it appear as if nations simply "bartered" exports for imports of equal value (Dornbusch 1988, p.3). Put another way, the theory of comparative advantage claims that real exchange rates will adjust to make all freely trading nations *equally competitive, regardless of the differences in their levels of development or of technology* . It is this hypothesis that gives rise to the empirical expectation that "[even though] an economy's international competitiveness might rise and fall over medium-term periods ... on average, over a decade or so, ebbs and flows of competitive "advantage" would appear random over time and across economies"(Arndt and Richardson, 1987, p. 12). It is from this perspective that Krugman and Obstfeld (1994, p. 20) inveigh against those who are benighted enough to believe that "free trade is beneficial only if your country is productive enough to stand up to international competition".

The empirical evidence has been quite unsupportive of the comparative advantage hypothesis. Over the postwar period, neither competitive advantages nor trade balances have been the least bit random across space or time. On the contrary, the "appearance of persistent, marked competitive advantage for [countries such as] Japan and marked competitive disadvantage for countries [such as] the United States", coupled with "persistent, marked trade balance surpluses for Japan and deficits for the United States" have characterized much of the postwar period (Arndt and Richardson 1987, p.12). In the end, neither the fixed exchange rate regimes of the Bretton Woods period, nor the flexible and highly volatile exchange rate regime which came into being in 1973, have altered this unpleasant fact. Figure 1 depicts the trade balances, as percentages of GDP, of the U.S. and Japan. The persistent imbalances they illustrate is a perfectly general phenomena.

Figure 1: Balance of Trade As a Percentage of GDP,
U.S. and Japan
Nominal Trade Balance as Percentage of GDP

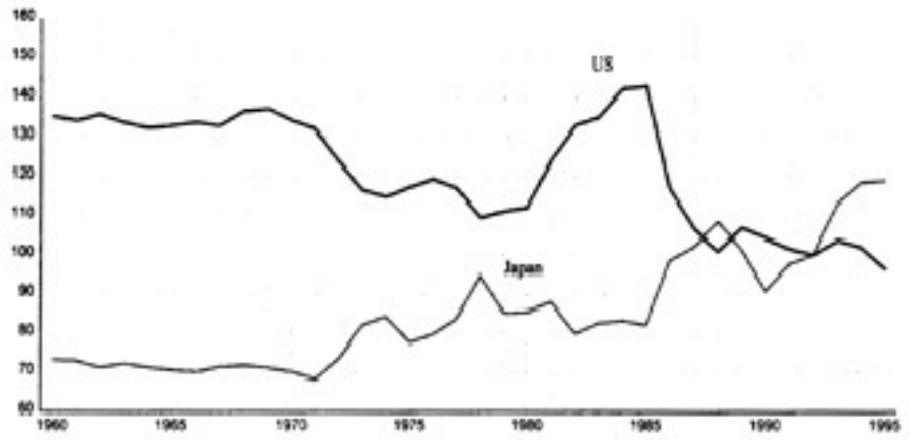
Source: IMP (FSY, 1997)



The other traditional explanation of real exchange rates is the Purchasing Power Parity (PPP) hypothesis[1], which claims that international competition will tend to equalize (common- currency) price levels of some major set of commodities across countries. The starting point for this argument is the notion that competitive arbitrage binds the various international prices of a given commodity together, within the limits of transportation costs, tarriffs, and taxes. Then if nations have roughly similar output or consumption baskets, the corresponding price indexes will exhibit similar movements when expressed in common currency. Of course, one must then still explain the basis of trade between such nations. One way to do so is to take the PPP hypothesis as a special case of comparative advantage, in which the trade-balancing real exchange rate happens to be roughly constant over time. Alternately, one could argue that competitive processes somehow equalize unit costs across nations (Officer 1976, pp.10-12). In either case, real exchange rates move so as to make nations equally competitive in the long run.

The PPP hypothesis of the equalization of common-currency price levels implies that *real* exchange rates are expected to be stationary over the long run[2]. But this is simply not empirically tenable. For instance, Figure 2 below charts the movements of real effective exchange rates in terms of producer prices for the U.S. and Japan. It is eminently clear that real exchange rates are simply not stationary in either the short run or the long run. This too is a perfectly general pattern, and we can immediately see why "tests based on aggregate price indexes overwhelmingly reject purchasing power parity as a short-run relationship"(Rogoff 1996, p.647), and why even the 50-year span of the postwar period does not provide much support for the notion that real exchange rates are stationary in some putative long run. This latter difficulty has forced supporters of the PPP hypothesis to argue that any convergence which might exist must be "extremely slow" (Rogoff 1996, p. 647), requiring perhaps 75 or even a 100 years of data in order to become evident (Froot and Rogoff 1995, pp. 1657, 1662).

Figure 2 Real Effective Exchange Rates)ppi basis): US & Japan
Source BLS, IMF (IFSY, 1997)(1992=100)



One can also formulate the PPP hypothesis in terms of the rates of change of the relevant variables, in which case it implies that nominal exchange rates will depreciate at the same rate as prices rise due to inflation (so as to maintain a constant real exchange rate). Figure 2 also makes it clear why this (relative) version of PPP is equally unsupportable as a general empirical proposition. However, in the particular case of high inflation, (relative) PPP *does* appear to hold (Froot and Rogoff 1995, p.1651), as illustrated in Table 1 below. This turns out to be an important piece of evidence, because the theoretical structure we utilize predicts exactly such a correlation in the case of high relative inflation (Shaikh 1995, p. 73-4.).

Table 1: Changes in Exchange Rates and Relative Price Levels, High Inflation Countries
(Barro 1984, p.542, Table 20.4: relative to the U.S., % change per year over 1955-1980)

	Relative Inflation Rate	% Change in Exchange Rate
Argentina	40.8	39.3
Brazil	26.6	26.4
Chile	47.0	44.1
Colombia	9.7	11.7
Iceland	14.2	13.5
Indonesia (1967-80)	16.4	10.8
Israel	13.2	13.4
Peru (1960-80)	13.1	11.8
South Korea	11.4	10.0
Uruguay	33.3	31.3
Zaire	12.1	16.1

3. The persistence of empirically weak theoretical models as a guide to policy

The travails of orthodox exchange rate theory have led to three types of reactions: some writers reject the very notion that exchange rates are regulated by any underlying economic factors (Harvey 1996, p.581); others, like those in the New International Economics school, retain the principle of comparative advantage but modify its conclusions by introducing "imperfections" such as oligopoly, economies of scale, and strategic factors; and finally, there are those that continue to adhere to PPP and/or comparative advantage doctrines, but are forced to argue that these hypothesized laws operate on a much longer time scale than previously imagined -- perhaps 75 years or longer.

In spite of all these problems, both PPP and comparative advantage hypotheses continue to be widely used in economic models. Stein (1995, p.185) claims that even though "most scholars are aware of the deficiencies of these models, the profession continues to use them wholly or partly because they do not have a logically satisfactory substitute".

More significantly, these same models continue to have a major influence on economic policy. For instance, the PPP hypothesis is frequently used as a policy rule-of-thumb, because when "a country establishes or adjusts an exchange rate peg, it generally relies on some type of quantitative framework, such as the PPP formula, in order to help assess the appropriate level for the new parity" (Isard, 1995, p. 70; see also pp. 59, 72). In a similar vein, the assumption that an unencumbered real exchange rate automatically makes all trading nations equally competitive regardless of their differences in technology or levels of development lies behind many of the modern neoliberal programs of the IMF and the World Bank (Frenkel and Khan, 1993)

The empirical and policy implications outlined above are of considerable importance to us, because the framework we utilize leads to very different conclusions.With this in mind, we turn to an outline of this alternate approach to the long run determinants of the real exchange rate, and to its policy implications.

II. An alternate approach to long run exchange rates

1. The basic theory

We have noted that conventional exchange rate models are rooted in the premise that in the long run all countries will be made equally competitive through automatic movements of their real exchange rates.

Our framework takes the opposite position: namely, that the international competitive position of a country, as measured by the real unit costs of its tradables, pins its real exchange rate. Such real costs in turn will depend on productivity and real wages. We will show in section 2 below that real exchange rates do indeed move parallel to real unit costs, over the long run.

Two major conclusions follow. First, the real exchange rate of a country will follow the time path of its relative real unit costs. Since these may be rising or falling over time, real exchange rates will generally be nonstationary. This is consistent with the evidence in Figure 1 earlier, which explains why the (absolute) PPP hypothesis does not hold. In addition, because real unit costs of production tend to change relatively slowly over any length of time (about 1% a year over 30 years in Figure 1), the difference between the rate of change of nominal exchange rates and relative national prices must be similarly small. But then if some country has a relatively high rate of inflation in any given year, its *nominal* exchange rate must depreciate at roughly the same rate in order to make the real exchange rate track the trend rate of change in real unit costs. This explains why neither absolute or relative PPP works when inflation rates are low (as in Figure 2), and also why relative PPP does appear to work when inflation rates are relatively high, as in Table 1 previously.

Secondly, competitively strong countries will tend to have balance of trade surpluses, because their relatively cheap products will enhance exports and discourage imports. Conversely, competitively weak countries will tend to run balance of trade deficits. But since the real exchange rate is pinned by real unit costs, it is not free to adjust to eliminate such imbalances, which will therefore be *persistent* . Any equilibrium in foreign trade will therefore come through the balance of payments, not through the balance of trade.

In order to grasp the logic behind this argument, it is useful contrast it with that of conventional economic theory. The two critical differences have to do with the meaning of the term competition, and with the consequences of competition in the international arena.

On the first point, by competition we mean real competition, in the sense of business competition, not "perfect" competition. Firms utilize strategy and tactics to gain and hold market share, and price cutting and cost reductions are major feature in this constant struggle (Shaikh 1980).

The second point has to do with the international implications of competition. Here, it is useful to note that conventional economic theory is marked by a striking disjuncture between its treatment of competition *within*

a country, and that of competition *between* countries.

As far as internal competition is concerned, virtually all theories agree that competition within a given country is driven by the law of *absolute costs*, that is to say, firms with lower unit costs of production enjoy an absolute competitive advantage. From this point of view, within any one country, high-cost regions would suffer from a competitive disadvantage. If unprotected from competition, firms in such a region would tend to have declining shares in the national market . Their higher costs would make it difficult for them to sell outside the region ("exports") and would leave their markets vulnerable to products originating in lower-cost regions ("imports"). In other words, in free *intra-* national trade, regions with higher costs would tend to have "balance of trade" deficits. This in turn implies that if such regions entered into trade with other more competitive ones within the same country, they would tend to suffer job loss and real wage declines --- at least until they caught up and/or their labor migrated elsewhere.

The curious thing is that when orthodox economics turns to the question of *external* competition, i.e. between nations, it stands its previously sensible description of competition on its head. Now, it is argued that trade between different countries is not ruled by absolute costs, but rather by comparative ones. The argument is well known, and need only be sketched here. In effect, it is assumed that if two initially unequally competitive countries were to open trade with one another, any initial disadvantage in the form of a trade deficit suffered by the higher cost country would be eventually overcome by the fact that its real exchange rate would continue to depreciate until its trade was balanced. This is because the assumed depreciation of the real exchange rate would cheapen the international prices of the country's own products and make more expensive the prices of the products of its trading partners, thereby enhancing its exports and restricting its imports. As long as a trade imbalance remained, this process is assumed to continue, so that in the end trade would be balanced. For a country with an initial competitive advantage and corresponding initial trade surplus, this same mechanism would erode its surplus until it too arrived at balanced trade. Thus the weak would be lifted, and the mighty humbled, all through the automatic operations of the invisible hand. In the end, all nations would end up equally competitive. As noted earlier, the resulting equilibrium real exchange rate would generally vary over time, though it might be stationary (i.e. might look like PPP) if both countries had similar commodity baskets.

The central point about the orthodox theory of international trade is that it abandons the absolute cost principle which regulates competition within a country, substituting in its place the principle of comparative costs. By way of contrast, Shaikh (1980, 1995) argues that the same general principle of absolute cost advantage regulates both competition within a country and competition between countries. Recall that in a competitive environment within any one country, high-cost regions would suffer from a competitive disadvantage which would make it more difficult for them to sell outside the region and more likely to import products from lower-cost regions, thus leading them to display structural "balance of trade" deficits -- at least until they managed to reduce their relative costs. Such deficits would of course have to be financed, either by running down some monetary stocks, or by attracting other funds from outside the region to cover its net import needs.

Within a nation, the relative prices of products are driven by the *best-practice producers*, the regulating producers. And as with all competition, the prices in question can be linked to unit costs, particularly to total (i.e. vertically integrated) unit labor costs. As a matter of accounting, we can decompose any unit price into its unit labor costs, its unit gross profits, and its unit materials costs. But the unit materials cost is itself simply the price of some bundle of commodities, and can itself be similarly decomposed, as can the materials costs of the materials costs, and so on. The upshot is that the price of the regulating producers can be decomposed into direct and indirect unit (vertically integrated) labor costs times an average gross profit margin over the various linked stages of production. The relative price of any two commodities therefore depends on the ratios of these same two terms. But precisely because each stage-averaged (i.e. vertically integrated) profit margin is an average of the regulating producer's own profit margin *and* of all profit margins in the industries directly or indirectly connected to its input requirements, each industry's vertically integrated profit margin picks up the profit margins of many other industries. Given the highly connected interindustrial structure of modern economies, it is not surprising to find that the dispersion of their relative vertically integrated profit margins is quite small. Thus it turns out that the relative vertically integrated unit labor costs of the regulating producers provide an excellent approximation to relative prices (Shaikh 1984; Ochoa 1988; Bienenfeld 1988; Milberg and Elmslie 1992)[3]. Appendix A provides a more formal treatment.

If we let p denote unit price, and **v** denote the unit vertically integrated labor cost of the *regulating* producer, then for any two industries within a nation we may write

1. p_i / p_j ë $\mathbf{v}_i / \mathbf{v}$

The same principle may be applied on an international scale, modified only to take into account the distinction between national currencies. Hence the relative *common-currency* prices of any two goods in the world market will be regulated by the total real unit labor costs of the best-practice producers of these products. Let e be the nominal exchange rate (foreign currency/domestic currency), p and p* the prices of domestic and foreign tradable goods, respectively. Then p·e/p* is the common-currency relative price of these two sets of tradables. Corresponding to this will be **v**', **v***', the best-practice vertically integrated unit labor costs of these same bundles of tradables, respectively, expressed in common-currency. Since the best-practice producers of the tradables of a given country may be spread out over several countries, many exchange rates may be implicit in the common-currency measures of these costs. International competition will then imply that the real exchange rate er is

2. er é p·e/p* ë **v**' /**v***'

Now suppose that there was some bundle of tradable consumer goods whose effective prices $p_{c\,T}$, p_{cT}* (adjusted for transportation costs, etc.) are equalized across the two countries. Then

3. $(p_{c\,T})$·e ë p_{cT}*

Let p_c, p_c* be the prices of consumer goods in the two countries, comprising both tradables and nontradables. Then if we write *real* best-practice vertically unit labor costs as **vr** = **v**/p_c , and let T = pc /pcT , we may combine equations 2 and 3 to yield the basic proposition (Shaikh 1991, 1995)

4. er é p·e/p* ë (**vr** /**vr***)·(T /T *) (over the long run)

The preceding result implies that the relative common-currency prices of the two countries -- *which is the real exchange rate between them* -- will be regulated by the real labor costs of the regulating capitals of those commodity bundles, adjusted for the tradable/nontradable content (the openess) of the consumption bundle (see Appendix B for further details). From this, it is only a short step to explain movements of the real exchange rate in terms of other price indexes such as CPI's or GDP price deflators.

2. Implications of the alternate approach to long run exchange rates.

Several practical implications can be derived from equation 4.

-- First, it allows us to derive a practical policy rule-of-thumb for the movements of the (real and nominal) exchange rate: the sustainable real exchange rate is that which corresponds to the relative competitive position of a nation, as measured by its relative real unit labor costs.

-- Second, it tells us that since the real exchange rate is pinned (through competition) by real unit costs and other factors, it is not free to adjust in such a way as to eliminate trade imbalances. Indeed, such imbalances will be persistent, and will have to be covered by corresponding direct payments and/or capital inflows. It follows that a currency devaluation will not, in itself, eliminate trade deficits. Rather, it would be successful only to the extent that it affect the real unit costs (via the real wage) and/or the tradables/nontradables price ratio of consumer goods (Shaikh 1995, p.72). And that depends on the ability of workers and consumers to resist such effects.

-- Third, it tells us that the real exchange rate of a country is likely to *depreciate* when a country's relative competitive position *improves* , other things being equal. Just as in the case of competition within a country, in which an industry with relatively falling costs will be able to lower prices, so too in international competition will a country's export prices fall relatively, in common-currency, when the corresponding relative real costs of

production fall. It should be added that just as a cost-based fall in a commodity price is very different from the fall in its price due to distress in the industry, so too is the competitive depreciation of a currency quite distinct from its depreciation due to a crisis.

-- Fourth, it tells that the real exchange rate between two countries will be stationary only when their relative competitive positions and relative degrees of openess remain unchanged over the interval examined. In the absence of these special conditions, the real exchange rate will be nonstationary, which implies that in general PPP will not hold (Figure 1).

-- Fifth, because relative real unit labor costs can only change modestly in a given year, the same is likely to apply to the long run trend of real exchange rates (shorter run factors are discussed later). For example, if relative real unit labor costs of a country happened to rise by 3% over some interval, then a relative inflation rate of 40% would imply a nominal depreciation of about 37%. In this way, (relative) PPP would appear to be a good approximation in the particular case of high inflation countries (Table 1).

-- Sixth, that free trade is beneficial to a country only when it is strong enough to stand up to international competition. This is precisely the proposition that Krugman and Obstfeld (1994, p. 20) dismiss as a "myth".

-- Finally, of great practical importance to policy, it allows us to distinguish between two basic routes to increasingly a country's international competitiveness. The *high road* which operates by continously improving productivity. And the *low road* which seeks to depress real wages and shift the burden of adjustment onto the backs of workers, and which is ultimately culminates in a dead end when these processes reach their political and social limits.

The preceding discussion has focused on the central tendencies of the real exchange rate, as expressed in equation 4. This is sufficient for a direct comparison of the real exchange rate with its hypothesized center of gravity, as in Figures 3-4 in the next section. But for econometric work, it is useful to extend the analysis to incorporate more volatile factors. And the key to this lies in the recognition that since trade imbalances will tend to be persistent (unless the real underlying factors are changed), equilibrium of the exchange rate requires a zero *ex ante* balance of payments. But then sharp changes in capital flows can easily give rise to corresponding changes in nominal and real exchange rates -- at least until the latter adjust back toward their long term trend. It is important to note that although sharp changes in capital flows represent disturbances to the more fundamental relation, they may nonetheless have long run effects if they persist over significant intervals of time. To capture the capital flow effect, we propose to use the interest rate differential between domestic and (a trade-weighted averages of) foreign rates. Equation 5 below then expresses the more general and econometrically testable proposition that real exchange rates depend on real factors (real costs and degree of openess), and on international interest rate differential i - i*. A more specific estimation system, which may then be posed in terms of cointegration models, is developed and tested at the end of the next section.

5. er é $p \cdot e/p^* = F[(\mathbf{vr}/\mathbf{vr}^*) \cdot (T/T^*), (i - i^*)]$

3. Empirical Evidence

Our basic long term hypothesis of equation 4 says that relative common-currency prices $p \cdot e/p^*$ (the real exchange rate er) will be regulated by its center of gravity $(\mathbf{vr}/\mathbf{vr}^*) \cdot (T/T^*)$, which is the corresponding best-practice vertically integrated unit labor costs adjusted for tradable/nontradable goods effects. We have chosen to measure all country variables relative to their trading partners, because in international competition countries compete against all others in the same league, so to speak. It is also empirically appropriate for the consideration of international capital flows, since capital flows out to many locations, and flows in from many others. For this reason, any conclusions about the *bilateral* relation between the U.S. and Japan would have to be drawn from their separate *multilateral* relations with their competitors and trading partners.

The central difficulty in constructing empirical measures of the necessary variables arises from estimating best-practice vertically integrated unit labor costs. First of all, since the commodities which comprise the tradables of a given country may have corresponding best-practice techniques in some other countries, one might use the unit labor costs of these other countries to construct the overall average best-practice cost of the

tradables bundle in question. Alternately, one might assume that any given country is one of the best-practice producers of its own exports, so that if we pose our question in terms of common-currency export prices (export-price deflated real exchange rates), the problem reduces one of estimating the unit labor costs of a given country's export sector.

Unfortunately, neither approach is easily implemented at the present time, due to a lack of appropriate data. For the present study, therefore, we have chosen to use producer price indexes as the proxy for tradable prices, and use the manufacturing sector as the base for the corresponding unit labor costs, since these variables are available for all of the major OECD countries over a sufficiently long time span. We need a broad sample of countries, because for each country we construct trade-weighted effective exchange rates and corresponding relative real unit labor costs, etc.

A second difficulty arises from the fact that the theory requires vertically integrated unit labor costs, and time-series data is only readily available for direct unit labor costs -- which is what we utilize. In order to estimate vertically integrated costs, one would need input-output tables for all of the countries involved, over a sufficient time span to permit the creation of an adequate time series. This too is beyond the scope of this study. Further details are in Appendix B.

In spite of these empirical limitations, the results we get are quite strong. Figure 3-4 show that the real effective exchange rates of the U.S. and Japan's do indeed gravitate around the corresponding real unit labor costs (adjusted for tradable/nontradable effects), both variables being defined relative to the trading partners of the country in question. The major exception is the 1980-87 period in the U.S., in which the effective real exchange first rises sharply from 1980-85, and then falls even more rapidly from 1985-87, thereby returning to its underlying trend. This period has been widely discussed in the literature, and there is considerable debate over its underlying causes. One prominent explanation has been that it arises from the large runup in the interest rate differential between the U.S. and its trading partners, leading to large short-term capital inflows which in turn slowed down as the interest rate differential was extinguished (B. Friedman 1991). We test this hypothesis when we econometrically estimate a version of equation 5 for the U.S. and Japan.

Figure 3 US: Real Effective Exchange Rates and Real Adjusted Unit Labor Costs
Source: BLS, IMF (IFSY, 1997)

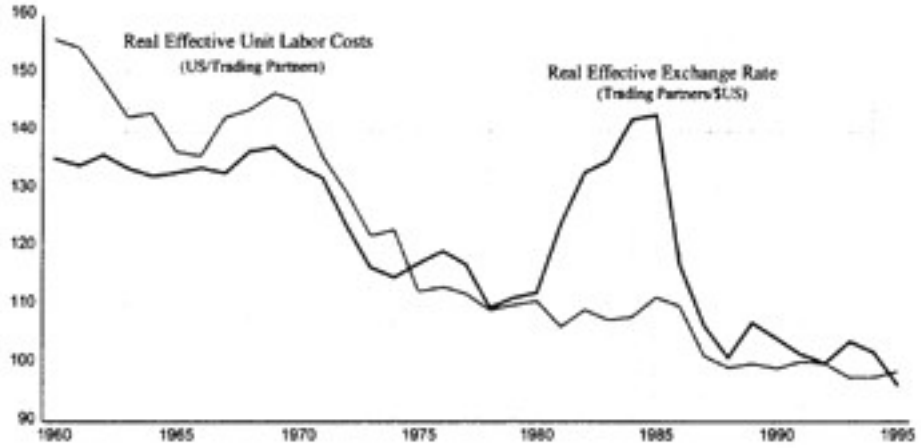
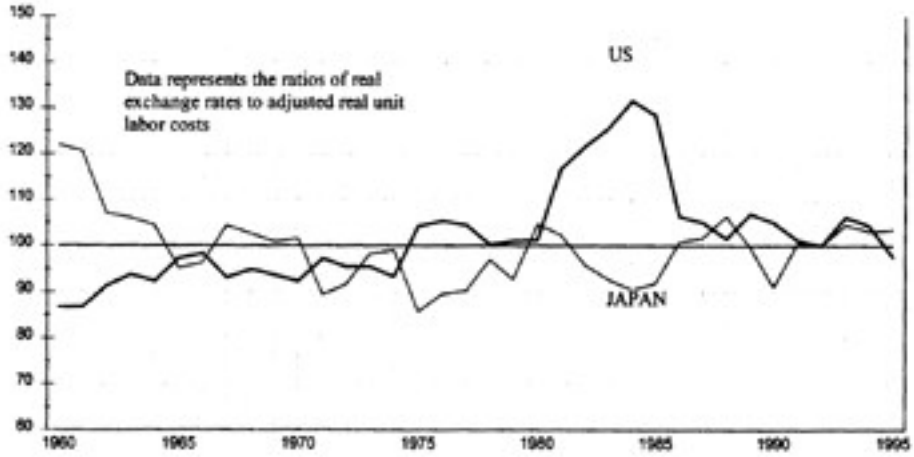


Figure 4 Japan: Real Effective Exchange Rates and Real Adjusted Effective Unit Labor Costs
Source: BLS, IMF (IFSY, 1997) (1992=100)

An alternate manner of formulating the hypothesis examined in Figures 3-4 is to take the ratio of each countries real exchange rate to its adjusted real unit labor costs. The stability of this ratio would then tell us the extent to which the former reflects the trend of the latter. Figure 5 depicts this ratio for both the U.S. and Japan. Given the data limitations discussed earlier, and the large impact of the anamolous 1980-87 period, it is remarkable how stable this ratio is over the long run. This provides us with a robust policy rule-of -thumb on the sustainable level of the real exchange rate, one which is far superior to the widely-used but empirically unreliable PPP hypothesis (recall Figure 2).

Figure 5 Exchange rate policy rules: US and Japan
Source: BLS, IMP (IFSY, 1997)



It now remains to provide an econometric estimate of our more general hypothesis of equation 5. We first consider whether each of the variables in this equation is nonstationary. Figures 3-4 have already indicated that for both countries real exchange rates and relative adjusted real unit labor costs are nonstationary, and the same property turns out to holds for interest rate differentials. Formal tests indicate that the natural logs of the first two, and the direct value of the third, can be characterized as having a unit root. We therefore test whether these three are cointegrated, using cointegration models in which each of the data series may have stochastic trends but no deterministic ones, and the cointegration equations may have an intercept (since each of our variables is relative to that of the OECD, the intercept need not be significant).

For the case of the U.S., Table 2 demonstrates that there exists a simple cointegration relation between the three. It is worth noting that the coefficients are of the right signs. In particular, the coefficient on the natural log of the adjusted relative real unit labor costs, which measures the long run elasticity of real exchange rates with respect to adjusted real unit labor costs, is very close to 1[4]. Very similar results hold for Japan. Once again the long run elasticity of real exchange rates with respect to real unit labor costs is very close to 1 (in this

case, not significantly different from 1). However, here the coefficient on the short run interest rate differential is of the wrong sign, although it is quite close to zero and therefore of not much economic significance.

Table 2: Cointegration Results for the United States, 1960-1995

Test assumption: No deterministic trend in the data **Included observations: 34**

Series: ln(er) , ln[(vr /vr*)·(*T* /*T* *)] , i -i*

Lags interval: 1 to 1

Eigenvalue	**Likelihood Ratio**	**5 Percent Critical Value**	**1 Percent Critical Value**	**Hypothesized No. of CE(s)**
0.362938	25.84371	24.31	29.75	None *
0.194355	10.51352	12.53	16.31	At most 1
0.088906	3.165715	3.84	6.51	At most 2

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

ln(er)	ln[(vr /vr*)·(*T* /*T* *)]	i - I*
1.000000	-1.042557	-0.136536
	(0.01530)	(0.04873)

Log likelihood 142.1562

Table 3 Cointegration results for Japan, 1960-1995

Test assumption: No deterministic trend in the data Included observations: 34

Series: ln(er) , ln[(vr /vr*)·(*T* /*T* *)] , i -i*
Lags interval: 1 to 1

Likelihood Eigenvalue	Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.341138	24.67900	24.31	29.75	None *
0.225643	10.49461	12.53	16.31	At most 1
0.051565	1.800046	3.84	6.51	At most 2

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

ln(er)	ln[(vr /vr*)·(*T* /*T* *)]	i - i*
1.000000	-0.992141	-0.005951
	(0.00459)	(0.00720)

Log likelihood 99.65228

III. Summary and conclusions

This paper has set out to test whether the framework developed in Shaikh (1980,1991,1995) can explain the long run movements of the real exchange rates of the United States and Japan. This framework extends the basic results of competition within a country to competition between countries. In this respect, it rejects the traditional hypothesis that competition between countries is characterized by comparative advantage, in favor of

the hypothesis that it characterized (like competition within any one nation) by absolute advantage.

The absolute advantage thesis implies that the long run real exchange rate of countries reflects their relative international competitive positions, as measured by their relative real unit labor costs. This implies that trade imbalances will tend to be persistent or slowly changing, that hypotheses such as PPP will not hold in general, and that only large and relatively persistent capital inflows will have significant additional effects on the real exchange rate.

One important practical implication of our results is that we can formulate a simple policy rule-of-thumb for judging the appropriate level of the real exchange rate: it is the level which is in line with the international competitive position of the country, as measured by its relative real unit labor costs.

Appendix A: Relative prices and relative vertical unit labor costs

Let p, u, pi, and m be the per unit price, labor costs, gross profits, and materials costs, respectively, of some given commodity. Then by definition we may write p = u + pi + m. However, the materials costs are simply the price of some bundle of materials, which in turn may be decomposed into unit labor costs, profits, and their own materials costs one (conceptual) stage back. This decomposition can be repeated on the material costs of the materials bundle itself, and so on, so that without any loss of generality we can always write (Shaikh 1984)

$p = u + pi + m = u + pi + u(1) + pi(1) + m(1) = u + pi + u(1) + pi(1) + m(1) + u(2) + pi(2) + m(2) + ...$

Denote the sum of all the direct and indirect unit labor costs by $v = u + u(1) + u(2) + u(3) + ...$ and that of all the direct and indirect unit gross profits by $pi^T = pi + pi(1) + pi(2) + pi(3) + ...$ Then

$p = v + pi^T = v\,(1 + p\quad)$

where $p\quad = pi^T / v$ = the average direct and indirect (i.e. the vertically integrated) profit-wage ratio. Note that this applies to any price whatsoever, since it follows from an accounting identity.

It follows that any two relative prices can always be written as

$p_i / p_j = (v_i / v_j) \cdot (z_{i\,j})$

where $z_{i\,j} = (1 + p\ \ i)/(1 + p\ \ _j)$ = the ratio of the vertically integrated profit-wage ratios.

Thus the relative price of any two commodities therefore depends on two terms: their relative vertically integrated unit labor costs, and their relative vertically integrated gross profit margins. But it is important to note that each industry's vertically integrated profit margin is an average of its own profit margin and of all those industries which are directly or indirectly connected to it by its input requirements. If all industries were directly or indirectly connected, then each industry's vertically integrated profit margin would be an average (a convex combination) of the same set of direct profit margins, with only the weights being different. Vertically integrated profit margins would therefore be much more similar than direct ones, i.e. their dispersion would be relatively small (Shaikh 1984). From this point of view, one may view the term zi j is as a "disturbance" term around the relative vertically integrated unit labor cost ratio (v_i / v_j).

Given the highly connected interindustrial structure of modern economies, it is not surprising to find that this is indeed true. Thus it turns out that the relative vertically integrated unit labor costs provide an excellent approximation, on the order of 90%, to relative prices (Shaikh 1984; Ochoa 1988; Bienenfeld 1988; Milberg and Elmlie 1992; Chilcote 1997). In national studies based on input-output data we cannot empirically distinguish between average and regulating producers. But for theoretical reasons, it is important to do so. And in the international arena, one may plausibly argue each country is the regulating producer for its own exports. For these reasons, we maintain the distinction between average (v) and regulating (**v**) vertically integrated unit labor costs, and write

p_i / p_j ë $\mathbf{v}_i / \mathbf{v}_j$

Appendix B: Data Sources and Methods

Each country's data was measured relative to its trading partners, using trade-weighted geometric averages with weights taken from the U.S. Bureau of Labor Statistics (BLS) publications on *International Comparisons of Manufacturing Productivity and Unit Labor Cost Trends* .

Real exchange rates were defined as nominal exchange rates (trading partner currency/local currency) deflated by the corresponding producer price indexes. The former were available on th BLS website, and the latter from the IMF, *International Financial Statistics of Income* (IFSY), 1997, CD version.

Real unit labor costs were defined as nominal unit labor costs divided by the consumer price index (CPI), both available from the BLS. The tradables/nontradables adjustment term * was defined as the ratio of the CPI to the PPI, the former being the general consumer price index (tradables and nontradables), and the latter being a proxy for tradable consumer goods prices.

Since the PPI price ratio appears on both side, it is important to note that the observed empirical relation between the real exchange rate and adjusted real unit labor costs is *not* caused by spurious correlation. Let u = relative nominal unit labor costs, p = producer prices, and pc = relative consumer prices. Then our empirical implementation of equation 4 is

$$er = p \cdot e/p^* = \frac{e}{(p^*/p)} = \frac{(u/pc)\cdot(pc/p)}{(u^*/pc^*)\cdot(pc^*/p^*)} = \frac{(u/p)}{(u^*/p^*)} = (u/u^*)\cdot(p^*/p)$$

The preceding establishes that the relative price term p*/p appears in the *denominator* of the real exchange rate term, whereas it appears in the *numerator* of the adjusted real unit labor cost term. If anything, this would predispose the two sides to move in opposite directions, as opposed to the common trends they actually display in Figures 3-4.

Finally, exports, imports, and GDP, all in current local currency terms, were obtained from the IMF, IFSY (op. cit.); while short-term nominal interest rates were obtained from the OECD, *Main Economic Indicators* and *National Accounts* , both available in electronic form from STATWISE, 1996. Interest rate differentials were measured relative to the average interest rate of the trading partners of each country, using the BLS trading weights described previously.

Notes

1. The PPP hypothesis follows from the law of one price, under additional assumptions such as the similarity of aggregate production or consumption bundles between countries. The law of one price is in turn a necessary, but not sufficient, component of the principle of comparative costs in a competitive setting. Thus one could have either PPP or comparative costs without having other, or one could have both.

2. If p = the domestic price level, p* = the foreign price level, and e = the nominal exchange rate (foreign currency per unit domestic), then the (absolute) PPP hypothesis is that $p \cdot e = p^*$. But this is equivalent to the statement that the real exchange rate ($p \cdot e / p^*$) is constant. Equivalently, it implies that the rate of change of the nominal exchange rate offsets the relative rate of inflation.

References

Antonopoulos, R. 1997. *An Alternate Theory of Real Exchange Rate Determination for the Greek*

Economy , unpublished Ph.D. dissertation, New School for Social Research, New York.

Arndt, S.W. and **Richardson J.D.** 1987 (eds) *Real-Financial Linkages among Open Economies* , The MIT Press, Cambridge, Massachusetts.

Barro, R.J. 1984. *Macroeconomics* , John Wiley and Sons, New York.

Bienenfeld, M. 1988. "Regularities in price changes as an effect of changes in distribution", *Cambridge Journal of Economics,* 12(2), June: 247-255.

Chilcote, E.B. 1997. "Interindustry Structure, Relative Prices, and Productivity: An Input-Output Study of the U.S. and O.E.C.D Countries", unpublished Ph.D. dissertation, Graduate Faculty, New School for Social Research.

Dernburg, T. F. 1989. *Global Macroeconomics* , Harper and Row, New York.

Dornbusch, R. 1988. "Real Exchange Rates and Macroeconomics: A Selective Survey", NBER Working Paper No. 2775, Cambridge, Massachusetts.

Friedman, B.J. 1991. "U.S. Fiscal Policy in the 1980's: Consequences of Large Budget Deficits at Full Employment", in *Debt and the Twin Deficits Debate* , J.M. Rock (ed.), Mayfield Publishing Co., Mountain View, California

Frenkel, J.A. and **M. S. Khan** 1993. "The International Monetary Fund's adjustment policies and economic development", in *International Finance: Contemporary Issues* , D.K. Das (ed.), Routledge, London.

Froot, K.A. and **K. Rogoff,** 1995. "Perspectives on PPP and Long Run Real Exchange Rates", in *Handbook of International Economics, Vol III* , G.M. Grossman and K. Rogoff (eds.), Elsevier, Amsterdam:1647-1688.

Harvey J. T. "Orthodox approaches to exchange rate determination: a survey", *Journal of Post- Keynesian Economics* , Vol 18, No 4, Summer 1996: 567-583

Isard, P. 1995. *Exchange Rate Economics* , Cambridge University Press, Cambridge, England.

Krugman, P. 1991, "Myths and Realities of U.S Competitiveness, *Science Magazine,* November.

Krugman, P. and Obstfeld M. 1994. *International Economics* , 3rd. edition, Harper Collins, New York.

Milberg, W. and Elmslie, B. 1992. "Technical Change in the Corporate Economy: A Vertically Integrated Approach", in W. Milberg (ed), *The Megacorp and Macrodynamics* , M.E. Sharpe, Armonk, New York.

Milberg, W. 1993. "The Rejection of Comparative Advantage in Keynes and Marx" mimeo, Department of Economics, New School for Social Research.
——— 1994. "Is Absolute Advantage *Passe?* Towards a Keynesian/Marxian Theory of International Trade", in *Competition,Technology and Money, Classical and Post- Keynesian Perspectives* , ed. Mark Glick, Edward Elgar, Great Britain.

Officer, L.H. 1976. "The Purchasing Power Theory of Exchange Rates: A Review Article", *IMF Staff Papers* , March.

Ochoa, E. 1988. "Values, prices, and wage-profit curves in the U.S. economy", *Cambridge Journal of Economics,* 13(3), September:413-430.

Rogoff, K. 1996. "The Purchasing Power Parity Puzzle", *Journal of Economic Literature* Vol. XXXIV (June), pp. 647-668.

Roman, M. 1997. *Growth and Stagnation of the Spanish Economy* , Avebury, Ashgate Publishing Ltd., Aldershot, Hants, England.

Ruiz-Napoles, R. 1996. *Alternative Theories of Real Exchange Rate Determination: A Case Study, The Mexican Peso and the U.S. Dollar* , unpublished Ph.D. dissertation, New School for Social Research, New York.

Shaikh, A. 1980. "On the Laws of International Exchange", in *Growth, Profits, and Property: Essays in the Revival of Political Economy* , E.J. Nell (ed.), Cambridge University Press, Cambridge.
———. 1984. "The Transformation from Marx to Sraffa: Prelude to a Critique of the Neo-Ricardians", in E. Mandel (ed.), *Marx, Ricardo, Sraffa* , Verso, London.
———. 1991. "Competition and Exchange Rates: Theory and Empirical Evidence", Working Paper No. 25, Department of Economics, Graduate Faculty, New School For Social Research, New York.
———. 1996. "Free Trade, Unemployment, and Economic Policy", in *Global Unemployment: Loss of Jobs in the '90's* , J. Eatwell (ed.), M.E. Sharpe, Armonk, New York.

Stein, J.L. "The Natrex Model, Appendix: International Finance Theory and Empirical Reality", in *Fundamental Determinants of Exchange Rates* , J.L. Stein and Associates, Clarendon Press, Oxford.