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THE EXCHANGE RATE SYSTEM

John Williamson

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J. W.

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Preface

The Institute for International Economics is a private nonprofit research institution for the study and discussion of international economic policy. Its purpose is to analyze important issues in that area, and to develop and communicate practical new approaches for dealing with them.

The Institute was created in November 1981 through a generous commitment of funds from the German Marshall Fund of the United States. Financial support has been received from other private foundations and corporations. The Institute is completely nonpartisan.

The Board of Directors bears overall responsibility for the Institute and gives general guidance and approach to its research program—including identification of topics which are likely to become important to international economic policymakers over the medium run (generally, one to three years) and which thus should be addressed by the Institute. The Director of the Institute, working closely with the staff and outside Advisory Committee, is responsible for the development of particular projects. The Director makes the final decision to publish an individual study, taking into account the views of a number of expert outside readers on each manuscript.

The Institute hopes that its studies and other activities will contribute to building a stronger foundation for international economic policy around the world. Comments as to how it can best do so are invited from readers of these publications.

C. FRED BERGSTEN
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1 Introduction

Exchange rates among the world's principal currencies have now floated for over a decade. That is sufficient time to have established beyond doubt that floating rates display a great deal of variability and that the adoption of floating does not resolve all balance of payments problems. Whether it would be possible to do better than the present system of "unstructured floating," neither free nor managed according to systematic principles, is the key question addressed in this study.

The move to floating rates in 1973 was welcomed, with varying degrees of enthusiasm, by most economists. Many had been arguing the desirability of greater flexibility for years, and even those who would have preferred limited flexibility—a combination of a wide band and a crawling peg—breathed a sigh of relief when the attempt to prop up the adjustable peg[1] was abandoned. The dire predictions of the consequences of floating that were voiced by defenders of the *status quo ante* before the event, regarding a prospective seize-up of the foreign exchange markets and major disruptions to trade, failed to materialize.

But the demonstration that floating is *viable* has not been matched by a consensus that it is *desirable*. Instead, more and more observers have been alarmed by the violent swings in exchange rates among the floating currencies—swings dramatically bigger than anything experienced by the Canadian dollar in the 1950s, which provided the experiment with floating that nurtured support in the 1960s.

In assessing the implications of the observed variability in floating exchange rates, it is important to distinguish between short-term *volatility* and persistent *misalignments*. By volatility is meant the amount of short-run variability in the exchange rate from hour to hour, day to day, week to week, or month to month. By misalignment is meant a persistent departure of the exchange rate from its long-run equilibrium level. These two dimensions of variability are distinct, for rates can be volatile around an equilibrium level of competitiveness or stable over long periods while misaligned. The first part of this study seeks to provide measures of both these dimensions of variability. Measuring misalignments is difficult and the measures are inherently imprecise, since they require estimation of what is termed the "fundamental equilibrium exchange rate" (abbreviated, with apologies, to FEER). Estimates are presented for recent misalignments of the five major currencies that compose the SDR.

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[1] The "adjustable peg" is the most apt term for the Bretton Woods exchange rate system, under which exchange rates were normally maintained within a narrow band around a fixed par value—but that par value or "peg" might occasionally be discretely adjusted, in a devaluation or revaluation.

The next section presents the case for a degree of management of the exchange rate designed to limit misalignments. It discusses the costs of both volatility and misalignments and argues that the past failure of economists to make this distinction has led to the major costs—those of misalignments—being overlooked. An attempt is also made to identify what is sacrificed by attempting to manage rates, as opposed to either fixing them or allowing them to float freely, and argues that those sacrifices are likely to be much less than the benefits of limiting misalignments provided that two conditions are satisfied. The first is that it proves possible to recognize misalignments, at least when they are large. The second is that the country has a convincing alternative anchor to control inflation, such as a determination to orient general macroeconomic policy to that end.

The fourth section considers alternative possible arrangements for systematically managing exchange rates with a view to limiting misalignments. It is argued that this would require an attempt to determine fundamental equilibrium exchange rates and a commitment to orient monetary policy at least in part toward discouraging excessive deviations from those "target" rates. The range within which deviations are not judged to be excessive is called a "target zone," although the term is used with some hesitation because it seems to be associated by some with a considerably more rigid system than that advocated in this study.

The final section discusses the role of surveillance by the International Monetary Fund (IMF) in negotiating and subsequently adjusting a set of agreed target zones among the major currencies, and supervising the consistency of countries' monetary-fiscal policies with their target zones.

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2 Measures of Exchange Rate Variability

As argued above, it is important to distinguish the two dimensions of variability, which are now often referred to as volatility and misalignments.

Volatility

One can conceive of two alternative approaches to measuring volatility. The first would be to seek the typical change in the rate from one period (hour, day, week, or month) to the next. This approach has traditionally been employed by the IMF. Summarizing recent findings, the Fund states (IMF, 1983, p. 9n):

> The increased flexibility of members' exchange arrangements in the 1970s as compared with the Bretton Woods system is evident from a comparison of the average magnitudes of exchange rate changes in the period January 1948–August 1971, and in the subsequent period through the end of 1981. For the Fund membership as a whole, the average monthly change (without regard to sign) rose fourfold, from 0.3 percent in the former period to 1.4 percent in the latter. . . . The increase in flexibility was more marked for the group of industrial countries, for which average monthly changes increased almost tenfold, from 0.2 percent to 1.9 percent.

The other approach is to seek the typical deviation of the rate from its short-run moving average. The natural measure of volatility under this approach is the coefficient of variation (standard deviation divided by mean) of exchange rates quoted at frequent intervals around a moving average. Rates quoted at frequent intervals cannot meaningfully be corrected for inflation, since price indices are published relatively infrequently, so the calculation is done in terms of *nominal* exchange rates. Similarly, what matter in the short-run decisions on which volatility impinges are *bilateral* rates against a particular currency, and especially against the major vehicle currency, the US dollar, rather than average—i.e., *effective*—exchange rates. Table 1 therefore compares the coefficient of variation of the other major currencies around a six-month moving average in the final years of the

TABLE 1 **Exchange rate volatility under pegged and floating exchange rates**

	1968	*1969*	*1975*	*1982*
Deutschemark	0.3	1.2[a]	1.7	1.6
French franc	0.1	2.3[a]	1.6	2.2
Japanese yen	n.a.	n.a.	0.7	2.5
Pound sterling	0.7[a]	0.2	1.0	1.1

n.a. Not available.

Note: Coefficient of variation of daily nominal exchange rate against dollar around six-month moving average, expressed as percentage.

Source: IMF *International Financial Statistics.*

a. Figure was influenced by a par value change.

Bretton Woods system,[2] in the first year of floating for which data are available, and in 1982.

It can be seen that exchange rate volatility in the Bretton Woods period was very sensitive to par value changes. In 1969 the French franc was devalued and the DM was revalued, and in consequence volatility was substantial. Similarly, the measure of sterling volatility in 1968 reflects the sterling devaluation of late 1967. In years when there was no par value change, volatility was small, an average of 0.2 percent. Under floating, volatility is regularly as large as it used to be in the years of par value changes under the Bretton Woods system, an average of close to 2 percent. Since par value changes were infrequent occurrences, it is clear that volatility on this measure has increased greatly since the advent of floating, by a factor of between 5 and 10, just as on the IMF measure. Moreover, volatility has, if anything, increased since the early years of floating, rather than diminishing as the markets gained experience. The conclusions that the increase in volatility is not sensitive to the particular measures chosen, and that volatility has increased since the mid-1970s, are consistent with the findings of Kenen and Rodrik (1983) and Shafer and Loopesko (1983).

It must be recognized, however, that other things besides the exchange rate regime changed between the late 1960s and the early 1980s. In particular, technological advances in telecommunications led to far closer links between the main markets, which enabled news to have an instantaneous worldwide impact on financial markets. Those advances occurred virtually simultaneously with the breakdown of the Bretton Woods system, so there is no easy test of the extent to which technological progress rather than floating may have been responsible for the increase in volatility that is shown by the data. In addition there has been a marked increase in capital mobility, resulting in part from the liberalization of capital controls in the United States in 1974, in Britain in 1979, and in Japan in 1980.

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[2] Data were not available for 1970.

Misalignment

A misalignment was defined above as a "persistent departure of the exchange rate from its long-run equilibrium level." It is necessary to justify this definition and to explain why one may usefully regard a rate as being misaligned even though it may clear the market (i.e., equate demand and supply). The most convenient way of doing that is to distinguish three concepts of equilibrium.[3]

MARKET EQUILIBRIUM This is simply the exchange rate that balances demand and supply in the absence of official intervention. This concept refers to the nominal rather than the real exchange rate, and tends to change rapidly whenever some relevant "news" changes. It is relatively easy to identify the presence of equilibrium in this sense, since the objective fact of nonintervention[4] implies that the rate is in equilibrium. Conversely, absence of equilibrium is signified by heavy intervention and perhaps reserve borrowing intended to sustain the rate. This concept of equilibrium is sometimes taken to be the only relevant concept by those of a monetarist persuasion.

FUNDAMENTAL EQUILIBRIUM This term is intended to connote the obverse of "fundamental disequilibrium," the criterion for an exchange rate change under the Bretton Woods system. Although the term was never formally defined, the IMF's (1970) report on the exchange-rate system implied that fundamental disequilibrium was a situation in which a country could not expect to generate a current account balance to match its underlying capital flow over the cycle as a whole without, on the one hand, depressing its income below "internal balance" or imposing trade controls for payments purposes or, on the other hand, importing inflation. Conversely, therefore, the fundamental equilibrium exchange rate is that which is expected to generate a current account surplus or deficit equal to the underlying capital flow over the cycle,[5] given that the country is pursuing "internal balance" as best it can and not restricting trade for balance of payments reasons. This second concept is what is often meant by "the rate justified by fundamentals." It is also what people usually have in mind when they describe rates as "overvalued" or "undervalued"—and it is used in that sense in this study.

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[3] The following discussion draws on Bergsten and Williamson (forthcoming 1983). The three-way classification suggested there has subsequently been extended to a five-level classification by Armington and Wolford (1983), who add "current underlying equilibrium" and "underlying equilibrium," but these concepts are not relevant for present purposes.

[4] An element of ambiguity does, however, enter through the existence of government transactions. The usual resort is to define nonintervention as a situation where the government does not seek to alter the timing of its transactions with a view to influencing the exchange rate.

The fact that a rate can become overvalued when a country inflates faster than its partners makes it obvious that this concept of an equilibrium rate relates not to the nominal exchange rate but rather to the *real* rate—i.e., the exchange rate adjusted for inflation at home and in competitor countries. Another term sometimes used to describe the FEER is the "purchasing power parity" or "PPP rate"—an expression that has been resisted here because of its unjustifiable suggestion that relative price levels *alone* are sufficient to pin down the long-run equilibrium level of the exchange rate. *Other things being equal*, however, one expects the nominal exchange rate consistent with long-run or fundamental equilibrium to change in accord with differential inflation, as posited by PPP theory.

The fundamental equilibrium exchange rate may change either because the underlying capital flow changes or because of changes in the pattern of demand for, or conditions of supply of, traded goods. Changes in underlying capital flows can on occasion be important: for example, when a country like Brazil gains access to the international capital market (in the early 1970s) or loses its creditworthiness (in the early 1980s). Whether one should also adjust the FEER to reflect the changes in capital flows that result from such fiscal developments as the emergence of a structural budget deficit in the United States is a difficult question, discussed later in this section.

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[5] Adoption of this definition for the FEER is in no way inconsistent with the fact that the vast bulk (probably over 90 percent) of the value of all exchange market transactions is on capital rather than current account, or with a belief that the *market* rate is determined by the views of wealth owners as postulated in the "asset market approach" to the explanation of exchange rates. (See Williamson, 1983, ch. 10 for an exposition of the asset market approach and references to the literature.)

Changes in demand and supply which affect long-run real equilibrium exchange rates go on all the time, but those large enough to have a perceptible macroeconomic impact seem to fall into three categories. First, differential productivity growth in different countries means that a fast-growing country like Japan will need some real appreciation over time.[6] Such changes are, however, gradual. Second, exploitation of important new resource discoveries—like North Sea oil—may permit a real appreciation. Such changes are easy to diagnose and relatively infrequent.

Third, *permanent* exogenous changes in the terms of trade may call for changes in competitiveness.[7] Terms of trade changes are again easy to observe, although judgment is certainly required to distinguish transitory from permanent changes. Even where changes are essentially permanent, as with the oil price increase of 1973, it does not necessarily follow that the real exchange rate should change greatly. Real exchange rate changes were called for to the extent that it was necessary to redistribute deficits among the oil importers, but they could not adjust away the surplus of the Organization of Petroleum Exporting Countries (OPEC), which depended only on the value of oil exports and the quantity of imports that OPEC chose to buy. In this instance the OPEC surplus changed underlying capital flows in a way that went a long way toward neutralizing the effect of changes in demand and supply.

This discussion suggests that, while fundamental equilibrium exchange rates are not immutable, they are not likely to change frequently and drastically. Moreover, it is possible to identify the factors that are likely to have a perceptible impact on (real) FEERs, and it is easy to trace the changes in nominal rates required to maintain real rates constant in the presence of differential inflation. Nevertheless, unlike the market equilibrium rate, there is no simple objective test of whether or not a rate is in fundamental equilibrium. At best, estimates of the FEER require judgments that in practice contain subjective elements regarding cyclical adjustment, the underlying capital flow, and trade elasticities. At worst, skeptics deny any hope of identifying the fundamental equilibrium rate. It is certainly true that the concept has a normative element, inasmuch as what constitute the ''underlying capital flow'' and ''internal balance'' depend on the macroeconomic policy regarded as appropriate. But the scope for differences to arise from pure divergencies in value judgments should not be exaggerated: one can sensibly debate the size (and sometimes the sign) of the capital flows needed to maximize welfare, and how much scope there is for expanding demand without rekindling inflation. Views on these topics *are* modified in the light of new evidence, even though one never expects to achieve unanimity.

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[6] This is true, at least, when real exchange rates are measured by a broadly based price index like the CPI or GDP deflator. See the classic analysis of Balassa (1964).

[7] The terms of trade is defined as the price of exports *divided by* the price of imports, while competitiveness or the real exchange rate is measured by the price of home-produced tradable goods *divided by* the price of competing foreign products. The two concepts reduce to the same thing in the simple exportables-importables model of trade theory, but they are very different in the real world. Thus an oil price rise worsens the terms of trade of an oil-importing country, but need not influence its competitiveness. In general a large country's terms of trade are influenced *both* by exogenous factors like the real price of oil *and* by endogenous factors like its level of income and competitiveness.

CURRENT EQUILIBRIUM This term is intended to indicate the rate that would obtain if markets had full knowledge of all relevant facts and reacted rationally to that knowledge. The current equilibrium rate will depend upon such temporary factors as the path of interest rates, which in turn depends on the stance of macroeconomic policy and the state of the business cycle, and, given risk aversion, on net asset positions vis-à-vis the rest of the world. The current equilibrium rate will deviate from fundamental equilibrium when policy variables are set at levels which drive the exchange rate away from its FEER. For example, a high interest rate relative to other countries will appreciate the currency involved, so as to create expectations of a yield-equalizing depreciation over the period that the high interest rate is expected to persist, as in the classic Dornbusch (1976) analysis.

This is the concept of equilibrium that most economists have in mind when they model the behavior of exchange rates, and hence further understanding of the properties of the current equilibrium rate can be obtained by studying the voluminous professional literature on exchange rate determination. It is apparently also sometimes what is meant by ''the rate justified by fundamentals''; clarity would be served if individuals who use this phrase would specify whether they are referring to the fundamental equilibrium rate or to the current equilibrium rate.

Given that knowledge is not perfect, one has to interpret the concept of the current equilibrium rate in a rational expectations sense, as the rate expected to equalize yields on comparable assets (in the simple case of risk

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