Flexible Exchange Rates and Interdependence

RUDIGER DORNBUSCH*

> The fundamental argument for flexible exchange rates is that they would allow countries autonomy with respect to their use of monetary, fiscal and other policy instruments. . . . The argument for flexible exchange rates can be put more strongly still: flexible exchange rates are essential to the preservation of national autonomy and independence consistent with efficient organization and development of the world economy.
>
> Harry G. Johnson (written in late 1960s)[1]

IN MOVING FROM the exchange control and trade discrimination of the 1950s to the open economic system of the 1960s, the world economy briefly returned to the liberal order that has been credited with fostering economic progress during the 40 years before World War I. There can be little doubt that the 1960s were the best decade the world economy has experienced in this century. But the very source of the success—active management of the macroeconomy that included designing the monetary and fiscal mix to achieve satisfactory, sustained growth—eventually created economic problems that fostered disintegration in the world economy. Differences in inflation preferences between the United States and Europe were irreconcilable, and productivity growth differentials were too large to accommodate a world economy using fixed exchange rates.

Harry Johnson's perceptive assessment, quoted above, was widely shared during the late 1960s. Flexible exchange rates were

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[1]See Johnson (1973), p. 199.

then seen as an essential further step toward a liberal world system that would allow countries to enjoy the advantages of free markets in goods and assets and yet enjoy domestic macroeconomic independence. Now, after ten years of experience with flexible exchange rates, there is much less confidence that flexible rates and domestic policy autonomy are reconcilable. On the contrary, the exercise of policy autonomy becomes nearly impossible under flexible rates, because many economies are too small and open to accept the exchange rate variations induced by policy. Alternatively, the effects of policies of countries with large economies are exported and interfere with foreign internal stability. What flexible exchange rates are still credited with is an ability to isolate a country from the world inflation *trend,* while it is recognized that they cannot isolate a country from either the effects of policies that initiate a *change in trend* or from any other disturbances.

The traditional argument against flexible exchange rates, derived from the experience of the interwar period, is that flexible rates are unstable, move about erratically, and often aggravate the macroeconomic stability problem. The experience of the last ten years would certainly lead an observer to endorse that view. Anytime there is monetary and fiscal dislocation in a major country, as there was in the United States in the 1970s, flexible rates perform poorly, because they lead to excessive real exchange rate changes and to the export of inflation or deflation. Flexible rates leave us with as much interdependence, or even more, as there is under a fixed rate regime. This paper reviews the channels of interdependence and asks in what directions one should look for a system that maintains an open world economy but more effectively comes to terms with the high priority given to national policy autonomy.

There are, broadly speaking, three avenues: (1) making exchange rates more fixed, (2) making them less flexible, or (3) as suggested by Modigliani and Tobin, limiting the incentives for short-run capital mobility, either permanently or on an ad hoc basis. It seems certain that free market economics bar consideration of a capital account tax, which might be seen as embodying a wicked infringement on individual freedom. It is also likely that U.S. macroeconomic policies and policies abroad remain unpredictable and uncoordinated to an extent sufficient to preclude establishment of an exchange rate band or even fixed rates. What is left, then, is the spirit of Versailles—that is to say, the recognition that there may be circumstances where it is not

impossible that there might be intervention, which could turn out not to be small. Consequently, a strong case can be made for a different domestic policy mix to go with flexible rates.

I. Channels of Interdependence

This section sketches a model of interdependence on the aggregate demand and supply sides. The purpose of the model is to draw attention to distinct channels and to identify the relevant parameters in assessing the importance of these sources of interdependence. The section begins by considering a standard macroeconomic model, focusing on prices, aggregate demand, perfect asset substitutability, and rational expectations. Extensions follow in subsequent sections.

EXCHANGE RATES, EMPLOYMENT, AND WAGES[2]

To study cyclical interdependence, this paper considers a country that faces a given world interest rate, given import prices, and a given world demand (except for real exchange rate effects) for its exports. The log-linear model is presented in equations (1) and (6):

$$y = a\theta - br + f;\ \theta \equiv e + p^* - w \tag{1}$$

$$m - q = hy - ci \tag{2}$$

$$q \equiv \beta w + (1 - \beta)(e + p^*) \tag{3}$$

$$r \equiv i - \dot{q} \tag{4}$$

$$i = i^* + \dot{e} \tag{5}$$

$$\dot{w} = \gamma y + \alpha(q - w) \tag{6}$$

Equation (1) represents the IS (investment-savings) schedule with θ denoting the real exchange rate, and f denotes a domestic or foreign shift variable. The real interest rate is denoted by r. The LM (demand for money = supply of money) schedule is represented by equation (2), where the price level is denoted by q. The price level is a weighted average of domestic prices, which are set

[2]This section combines sticky price, rational expectations models of exchange rate dynamics and the sticky real wage literature. See Sachs (1979), Branson and Rotemberg (1980), Dornbusch (1980), Argy and Salop (1979), Buiter and Miller (1981, 1982), Marston (1982), Modigliani and Padoa Schioppa (1978), and Obstfeld (1982).

equal to wages, and of import prices. Equation (4) defines the domestic real interest rate, and equation (5) expresses the assumption of perfect asset substitutability, with an adjustment made for anticipated depreciation. Wage dynamics are specified in equation (6) and are linked to the gross national product (GNP) gap, y, and to the real wage level. The term $q - w$ represents a rigid real wage effect.[3]

This model is appropriate to short-run cyclical issues. It neglects trend inflation, foreign inflation, productivity growth, and the impact of capital formation. It concentrates on aggregate demand and the cyclical interaction between wages, interest rates, and exchange rates. At any point in time—given home wages, money, and fiscal policy—an exchange rate and a depreciation rate can be found that satisfy the international interest rate relation. The wage level and the exchange rate determine external competitiveness and, hence, aggregate demand and employment. The system can be simplified by noting the relation between home and foreign interest rates:

$$r \equiv r^* + \beta\dot{\theta};\ i = r^* + \dot{\theta} + \dot{w} \tag{7}$$

The model is slightly more complex than the extended Mundell-Fleming model because of two modifications. On the one hand, care is taken to allow for an impact of import prices on the price level used to deflate real balances and real wages and to define the real interest rate. On the other hand, the domestic producer price index (which, here, is the wage) responds not only cyclically but also to the real wage level.

The role of wage behavior can be appreciated by looking at the long-run behavior of the system as shown in Figure 1. For a given world interest rate, the IS schedule shows equilibrium in the domestic goods market. A real depreciation creates excess demand, which is met by an increase in output. Along $\dot{w} = 0$, money wages are constant. A real depreciation, because it reduces real wages, leads to wage increases. To keep wages constant, the reduction in the standard of living owing to depreciation must be offset by unemployment that dampens wage demands. Hence, $\dot{w} = 0$ is downward sloping. The slope of the constant wage schedule is determined by the relative response of wages to the cyclical position and to the standard of living via the real exchange rate

[3]The foreign price level and the full employment level output are chosen to be equal to one, and thus their logs are zero.

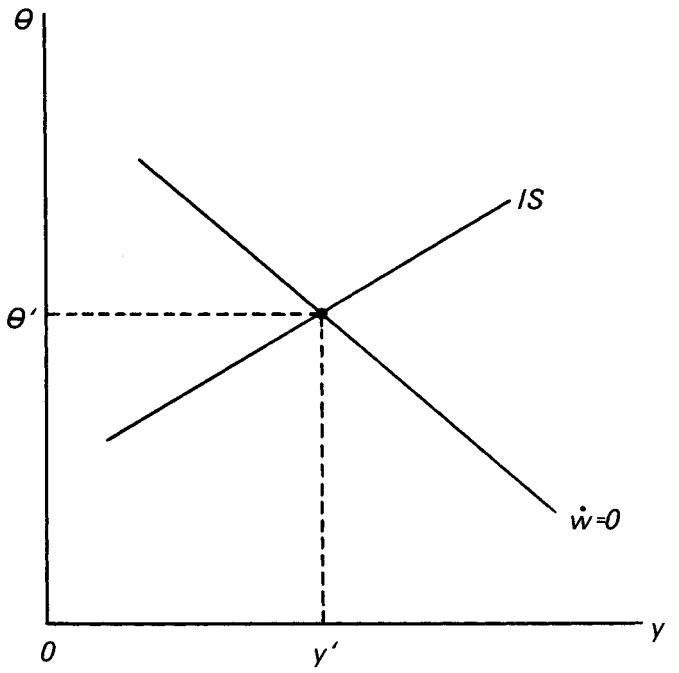

FIGURE 1

$$\left.\frac{d\dot{\theta}}{dy}\right|_{\dot{w}=0} = \frac{\gamma}{\alpha(1-\beta)} \equiv \lambda \tag{8}$$

The pattern of wage response will determine the long-run effects of disturbances on output and the real exchange rate. A reduction in foreign demand or a rise in world interest rates, for example, will shift the IS schedule upward and to the left. The decline in employment is larger, the flatter the $\dot{w} = 0$ schedule or the lesser the cyclical responsiveness of wages relative to the real wage stickiness as measured by the parameter λ. If the wage is highly responsive cyclically and real wage rigidity is nearly absent, λ tends toward infinity and the economy behaves as if it had full wage and price flexibility, which ensures rapid adjustment to full employment. Conversely, when cyclical flexibility is limited and real wage resistance is strong, λ tends toward zero. Adverse dis-

turbances then can lead to a large impact on the price level combined with unemployment.[4]

The model described in equations (1) to (6) can be reduced to the behavior over time of money wages and the real exchange rate (see Appendix). Figure 2 shows the dynamics by reference to the loci along which wages and the real exchange rate, respectively, are constant. Moving up along the $\dot{w} = 0$ schedule, an increase in the wage raises the price level and thus reduces real balances and exerts deflationary pressure, which causes wages to fall unless a cut in the real wage owing to real depreciation exerts an offsetting impact. The schedule *FF* shown in Figure 2 represents the stable trajectory under perfect foresight. Given any initial money wage, the corresponding point on *FF* shows the equilibrium level of the

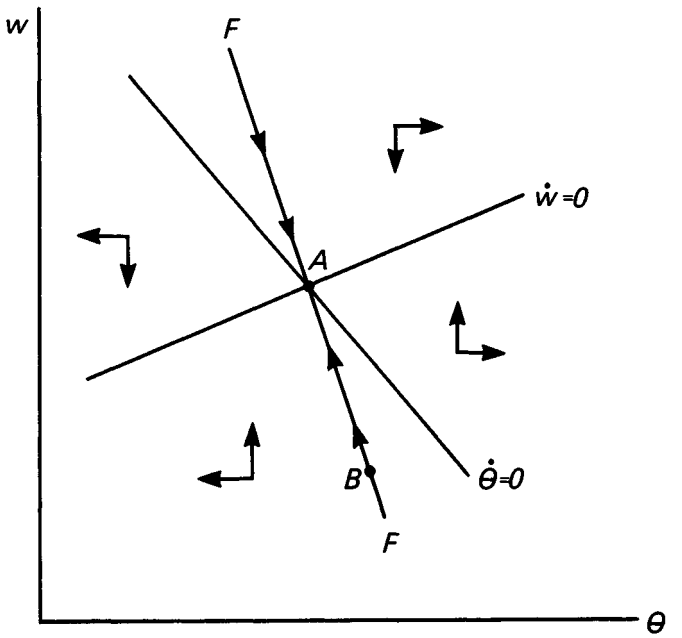

FIGURE 2

[4]From equations (1) and (6), setting $\dot{w} = \dot{\theta} = 0$, we obtain $y = (f - br)/(1 + a\lambda)$.

nominal and real exchange rates such that the economy converges to long-run equilibrium at point *A*.

At point *B*, for example, the wage is low, and thus the price level tends to be low, which makes for high real balances and low nominal interest rates. To maintain international interest parity, the exchange rate must appreciate, which means that the real exchange rate must be above the steady-state level. At point *B*, as one can verify by looking at Figure 2, the real exchange rate favors the home country; and because of real appreciation, by equation (7), the real interest rate is below the world level. Thus, aggregate demand and employment are high. High employment and the high real exchange rate or the low real wage exert upward pressure on the wage, which pushes the economy toward point *A*.

The framework can now be used to investigate the impact of foreign disturbances on home wages and employment. Using Figure 3, the effect of an increase in foreign interest rates can be

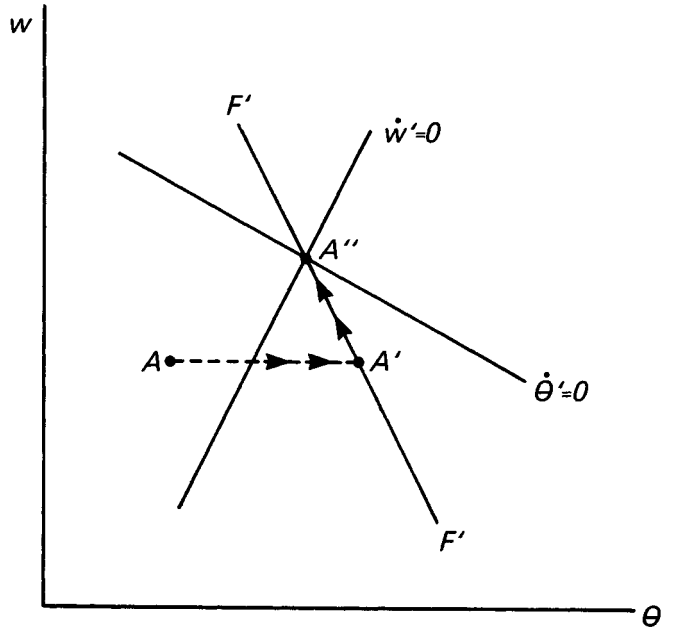

FIGURE 3

studied. Assume that wages increase in the long run and that the exchange rate depreciates. As Figure 3 shows, the exchange rate will overshoot, moving immediately from the initial equilibrium at point A to a short-run equilibrium at A'. The rise in foreign interest rates creates an incipient capital outflow, which leads to exchange depreciation. When point A' is reached, home interest rates have risen somewhat, and there is now expected appreciation, which assures a sufficient return on domestic securities. Changes in employment and in the standard of living combine to generate wage pressure that moves the economy over time to A''. In the long run, of course, there will be some unemployment.

The adjustment pattern is shaped by all the parameters, including particularly the dynamics of wages, income and interest responses of money demand, and the price elasticity of demand for goods. What is crucial to the initial behavior of the exchange rate is the long-run adjustment of money wages. If wages increase in the long run, then the exchange rate must overshoot in the short run, as is shown in Figure 3. In contrast, if wages decrease in the long run, then there will be an immediate depreciation of the nominal and real exchange rate, but a more moderate one. In the subsequent adjustment process, the exchange rate will continue to depreciate. This case is shown in Figure 4.

It is interesting to note that either exchange rates or unemployment *must* overshoot. As shown in Figure 4, unemployment must overshoot, because at point A' the real exchange rate is depreciating, which means that real interest rates are above the world level, and the real exchange rate is below its long-run level. For both reasons, demand and, hence, employment at A' will be less than at A'', the final equilibrium. Exactly the opposite occurs at A' in Figure 3, where employment is above the new long-run level. It is not certain, though, whether it is possible for employment to actually rise relative to the initial equilibrium at A in Figure 4.

The overshooting of exchange rates or employment makes it interesting to ask what factors would make one or the other case more likely. As was noted previously, the outcome depends on the long-run adjustment of wages, which, in turn, depends on several parameters. A high price elasticity of demand implies small changes in equilibrium real exchange rates and, therefore, relatively little pressure on wages and output. A high price elasticity thus implies a long-run increase in wages to accommodate the reduced demand for real balances and the consequent ex-

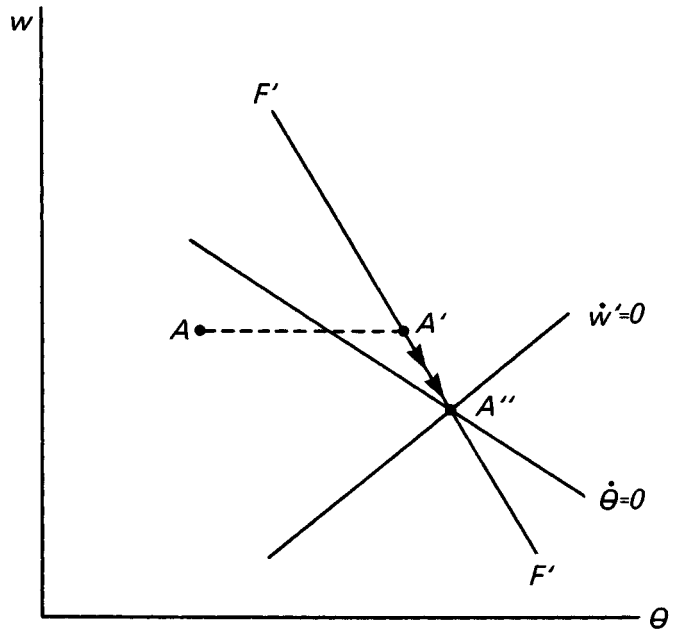

FIGURE 4

change rate overshooting shown in Figure 3. A high interest rate elasticity or income elasticity of money demand works in the same direction. In contrast, a high cyclical response of wages implies that wages could fall in the long run.[5] In the same way, one can analyze the impact of foreign demand disturbances or changes in domestic fiscal policy. Again, one finds that employment or exchange rate overshooting is possible, depending on the pattern of wage flexibility relative to the parameters of aggregate demand.

The effects of disturbances on domestic employment and on wages will presumably differ, depending on the direction of change. One would expect an asymmetry in the real wage resistance, in that workers accept gains in real wages but resist cuts. This extends also to the cyclical behavior of wages; wages rise more rapidly in a boom than they fall in a recession. In terms of

[5]See the Appendix for the long-run solutions to w and θ.

the model, this amounts to saying that the coefficient of wage flexibility, λ, depends on the cyclical and real wage positions. Specifically, starting from full employment, a decrease in foreign demand or an increase in world interest rates will lead to unemployment and to a decline in real income. But an increase in foreign demand or a decrease in world interest rates brings about a real appreciation at full employment rather than a lasting real expansion beyond capacity.

The asymmetry issue is relevant once one considers transitory disturbances. Suppose, for example, that a transitory increase in world demand, caused by a boom abroad, leads to a real appreciation at full employment. Once the boom abroad subsides, the issue arises whether workers are willing to accommodate themselves to a cut in real income brought about by the ensuing real depreciation. There is no reason to dismiss the possibility of a ratchet effect in the operation of real wage resistance.

But if ratchet effects are present, the cyclical variability of real exchange rates, under a flexible exchange rate regime, necessitates consideration of an incomes policy that accommodates the changes in the standard of living associated with real exchange rate movements. Alternatively, active fiscal policy needs to be used to stabilize real exchange rates over the cycle to avoid the real appreciation that cannot, afterward, be undone without adverse effects on employment. But that, of course, raises the question whether there is more fiscal resistance than real wage resistance. In any event, it is clear that transitory disturbances abound; that transitory real appreciation owing to strong demand raises the standard of living cyclically; and that instruments are necessary to dampen or to accommodate the subsequent decline.

So far, this paper has dealt with the case of a country that takes world demand and interest rates as exogenous. It is worthwhile to comment briefly on the changes brought about by repercussion effects. Without going into details, this study recalls the Mundell-Fleming results specifying that with prices given, a monetary expansion in one country has adverse employment effects abroad. Conversely, a fiscal expansion has favorable employment effects abroad. These results depend critically on the behavior of the real money stock in each country. They may cease to hold the moment import prices enter the real balance deflator. Specifically, as a fiscal expansion spreads abroad through real appreciation, it reinforces the expansion in the initiating country, but it reduces real balances abroad, thus tending to confine the expansion. If real

wage resistance is an issue, this adverse effect of depreciation is strongly reinforced. In contrast, a monetary expansion may, in such circumstances, raise income abroad.

INTEREST RATES AND RISK PREMIA

The discussion in the previous section was based on the assumption that securities are perfect substitutes once anticipated exchange depreciation is taken into account. Under that assumption, real interest rates are equalized in long-run equilibrium and in the short run can only differ by an amount equal to the rate of change of the real exchange rate. But the assumption of perfect asset substitution is not warranted once real exchange rates fluctuate.

Movements in real exchange rates introduce negative correlation in the real returns on domestic and foreign securities and thus create an incentive for portfolio diversification. Only in a very special case, when relative asset supplies match the minimum variance portfolio shares *and* when there are identical consumption baskets across countries, will there be no risk premium. In general, there is a risk premium that is related to relative asset supplies and to the distribution of world wealth.

In the presence of a risk premium, the interest rate relationship becomes

$$i = i^* + \dot{e} + \rho(V/E\widetilde{W},\ W/E\widetilde{W});\ \rho_1 > 0\ \rho_2 > 0 \qquad (9)$$

where V and W denote, respectively, domestic outside debt and domestic wealth, each measured in home currency, and $\widetilde{W}$ denotes world wealth measured in foreign currency. Equation (9) thus introduces a relationship between interest rates, expected depreciation, the nominal exchange rate level, nominal wealth, and asset supplies. Where in the earlier model nominal money was the only asset to play a role, now the supply of domestic outside nominal assets also appears.[6] An increase in the relative supply of domestic assets, $V/\widetilde{W}E$, must be accommodated by either a more rapid rate of appreciation or a higher nominal interest rate differential or else must be offset by depreciation of the exchange rate *level.*

The link between exchange rates and portfolio balance can be inferred from equation (9), taking the case of a small country, so

[6]For references to the extensive risk premium literature, see the review in Dornbusch (1983) and Krugman (1981).

that world wealth $\widetilde{W}$ is taken as given. Furthermore, assuming given interest rates and a given rate of depreciation, $i - i^* - \dot{e}$, one can find the relation between changes in domestic currency asset supplies, changes in wealth, and the corresponding changes in equilibrium exchange rates, which can be expressed by

$$\hat{E} = \hat{V} + \frac{\rho_2}{\rho_1 + \rho_2}(\hat{W} - \hat{V}) \tag{10}$$

Equation (10) shows that for a given depreciation-adjusted interest differential, an increase in domestic currency assets and wealth, in the same proportion, leads to equiproportionate depreciation. An increase in wealth, given asset supplies, leads, in contrast, to appreciation. On the one hand, an increase in wealth reduces, via domestic habitat effects, the risk premium and thus brings about appreciation; an increase in domestic currency asset supply, on the other hand, leads to a higher risk premium and, thus, to depreciation.

The risk premium introduces two important considerations. The first is that the composition of domestic assets, between money and debt (money being the medium of exchange for which there is a specific demand), is of importance and that open market operations therefore exert an effect on exchange rates that is independent of the effect of the change in money. This point can be illustrated in the following manner: The macro model sketched out previously determines interest rates as functions of the real money stock and real income. The model is closed by finding an exchange rate that satisfies both the macro model and the risk premium equation. An increase in debt or in home relative wealth then must affect both interest rates and exchange rates.

The second consideration introduced by the risk premium is that it constitutes a link between wealth distribution in the world, interest rates, and the exchange rate. A rise in domestic wealth leads to changes in both interest rates and exchange rates. Interest rates at home decline and/or the exchange rate appreciates. This effect is added to the macro model and provides a channel through which dynamic effects associated with the current account and the budget have implications for the exchange rate.

Intervention policy must be considered in relation to the risk premium. Intervention, viewed from that perspective, takes one of two forms. If purchases of foreign exchange are allowed to change the domestic money stock, intervention will be effective. But if there is sterilization, this has implications for the relative

supply of domestic debt and, thus, for the risk premium. Sterilized intervention, it has been argued, is simply a reshuffling of the composition of domestic government liabilities. It has an effect on exchange rates only through the impact on the risk premium. Thus, it can work only when a risk premium exists. Moreover the effectiveness—the bang per buck—depends on risk aversion being high and the variability of real interest differentials being large. Thus, intervention policy works well when uncertainty is large and risk aversion is pervasive.

The risk premium has been singled out as an important channel through which the current account affects the exchange rate. While the current account qualifies in principle as a determinant of exchange rates, it stands to reason that changes in wealth that are not included in the current account should really move to the center of attention. In particular, capital gains resulting from stock market movements certainly have a far larger impact on relative wealth than the current account does. In addition to the stock market, total domestic saving is a source of changes in relative wealth. Again, the current account's share of saving is typically, though not necessarily, small. Except in special cases, the role of the current account in affecting exchange rate movements, via the risk premium, is not a large one.

THIRD COUNTRY EFFECTS

The perspective that this paper has adopted so far has been that of a country faced with external shocks. The paper now shifts to the perspective of the system to examine the important cyclical interdependence that arises from the behavior of materials prices and import demands of peripheral countries. These countries are predominant exporters of materials and importers of manufactures. They are also debtors.

Table 1 reports regressions of various measures of the *real* prices received by developing countries affected by the world business cycle, the real price of oil, and the real U.S. dollar exchange rate. The cyclical variable is the Organization for Economic Cooperation and Development (OECD) unemployment rate, which is taken from the OECD's *Economic Outlook,* and the real exchange rate is measured by the relative wholesale prices of manufactures of the United States (relative to trading partners), which are taken from the Fund's *International Financial Statistics.* Equation (1) in Table 1 shows export prices relative to import prices of non-oil developing countries. The real oil price and the

TABLE 1. DETERMINANTS OF THE TERMS OF TRADE AND REAL COMMODITY PRICES, 1964–81[1]

Equation	Dependent Variable	Constant	OECD Unemployment	Real Oil Price	Real Dollar Exchange Rate	R^2	D-W	*Rho*[1]	*Rho*[2]
(1)	Terms of trade	1.64 (0.70)	−0.01 (0.02)	−0.001 (0.0004)	−0.31 (0.14)	0.76	1.79		
(2a)	Real materials prices (Fund)	9.04 (1.58)	−0.06 (0.028)	—	−0.88 (0.32)	0.39	1.94	0.07	
(2b)	Real materials prices (Fund)	2.96 (1.31)	−0.15 (0.03)	0.16 (0.05)	−0.78 (0.26)	0.68	2.17	0.28	−0.73
(3a)	Real materials prices (World Bank)	2.22 (1.63)	−0.05 (0.023)	—	−0.64 (0.34)	0.25	1.81		
(3b)	Real materials prices (World Bank)	−1.18 (1.36)	−0.16 (0.03)	0.19 (0.05)	−0.49 (0.27)	0.66	2.02	0.29	−0.59
(4)	Real minerals and metals prices	−4.53 (1.30)	−0.20 (0.027)	0.22 (0.05)	0.78 (0.26)	0.89	1.97		
(5)	Real agricultural prices	3.71 (2.0)	−0.04 (0.03)	—	−0.98 (0.41)	0.28	1.85	0.15	

[1]Standard errors are in parentheses. The left-hand-side variable and the real dollar exchange rate are expressed in logs, as is the real oil price, except in equation (1). D-W denotes the Durbin-Watson statistic. *Rho*[1] and *Rho*[2] denote the coefficients for correction of first-order and second-order serial correlation.

real dollar exchange rate are significant explanatory variables; a dollar appreciation or an increase in real oil prices leads to deterioration of developing countries' terms of trade. So does a rise in OECD unemployment, although here the coefficient is not precisely estimated. Equation (1) shows that a 1 percent real dollar appreciation would lead to a deterioration of developing country terms of trade by ⅓ of 1 percent. This is, of course, a very sizable effect.

In equation (2a), the dependent variable is the Fund's index of the prices of all commodities (reported in *International Financial Statistics*) deflated by the dollar price of manufacturers' exports from developed countries (reported in the United Nations' *Monthly Bulletin of Statistics*). Again, real dollar appreciation has a significant adverse impact on the real prices of materials. For this measure of real prices, a 1 percent real dollar appreciation leads to a nearly proportional deterioration in real commodity prices. In equations (3a), (3b), (4), and (5), it is shown that the results are not consistent, differing significantly between commodities. Equation (3a) reports the results for the World Bank's index of 33 commodities (see Grilli (1982)) deflated by the dollar prices of manufactures as was done for equations (2a) and (2b). The results are substantially the same as those for equations (2a) and (2b). The index is made up of agricultural commodities (70.6 percent), metals and minerals (24.3 percent) and timber (5.1 percent). Equations (4) and (5) show that real dollar appreciation leads to an *increase* in the real price of minerals and metals, but to a *decrease* in the real price of agricultural commodities. The latter, presumably because of their predominant weight in the index, carry the results in the regressions for the total commodity group. The difference in the more disaggregated results suggests that the whole question, including the important issue of using alternative cyclical variables,[7] should be studied further.

Consider now how these third country effects operate when, say, the United States tightens its monetary policy. This would lead to increased nominal and real interest rates and to a slowdown in demand in the United States. The dollar would appreciate in nominal and real terms. This paper has already discussed the direct effects on industrial countries of higher interest rates

[7]Regressions using residuals from a regression of the OECD industrial production index on two time trends (as the cyclical variable) performed more poorly in establishing significant determinants of the left-hand variable than the regressions whose results are shown in Table 1.

and reduced exports; they unambiguously translate into unemployment unless there is no real wage rigidity. But now there are additional effects caused by the impact of events in the United States on the material producing debtor countries. Higher real interest rates worsen those countries' current accounts. This is reinforced by the decline in demand by industrial countries for both manufactures and materials and, finally, by the effect of dollar appreciation on the real prices of materials. This combination is quite devastating for material exporting debtor countries. Typically, they will be forced to limit their own growth because of balance of payments constraints.

As seen from the perspective of industrial countries, the adjustments in material exporting debtor countries have two sides. Industrial countries as a group achieve a direct terms of trade improvement relative to material exporters, both for cyclical reasons and because of dollar appreciation. This gain may, however, be dampened, perhaps substantially, by the decline in developing countries' imports of manufactures.

Changes in the real prices of commodities during the cycle or as a by-product of changes in key exchange rates play an important role in relation to real wage rigidity. The deterioration in developing countries' terms of trade may well offset some of the real income loss an individual industrial country experiences as a result of, say, higher U.S. interest rates.

BUBBLES, PESOS, AND RUNS

The preceding sections have focused on *actual* changes in exchange rate fundamentals, cyclical or permanent, that affect goods or asset markets and then affect the rest of the world through asset demands, demands for goods, exchange rate movements, and prices. However, many of the disturbances in the world economy are not the result of actual changes in fundamentals but rather of changes in expectations about the future course of these fundamentals. These revisions in expectations exert effects on interdependence that are as powerful as those exerted by actual changes in fundamentals.

When asset markets are dominated by expectations about the future course of fundamentals, exchange rates may move in ways that do not promote macroeconomic stability. Three ways in which this situation may come about deserve special attention. The first is familiar from recent literature on financial markets and

concerns the possibility that exchange rates, in part, are determined by irrelevant information. Market participants may have the wrong model of fundamentals, and their expectations, based on the wrong model, will affect the actual exchange rate. If there is sufficiently high serial correlation in the irrelevant variables, it may be impossible to discern the systematic forecast errors using conventional efficiency tests. But the exchange rate will be significantly more volatile than is warranted by the true model.

This point is important because market participants may be impressed by a plausible fundamentals variable, attribute explanatory power to it, and, consequently, make their expectations actually come true. Then, when some other variable moves, attention may shift to a different "main factor," which, in turn, comes to dominate the exchange rate for a while. Exchange rates carried by irrelevant beliefs are troublesome, not only because of the excess variance but also because shifting from one irrelevant factor to another will precipitate major exchange rate collapses. The possibility that exchange rates are sometimes far out of line with the fundamentals cannot be discounted. It is important to recognize this, because in the past economists may have given excessive weight to the notion that the market knows "the model" and, at the same time, is rational. It is quite conceivable that a number of fashionable factors, such as fiscal discipline, basic monetary control, long-run strength in manufacturing, and *Angebotsfreundliche Gesellschaftspolitik* (supply side policy) play a role, one at a time.

The second source of disequilibrium exchange rates is expectations about the possibility of regime changes and has been called the "peso problem." In this perspective, exchange rates are influenced not only by current fundamentals but also by agents' expectations that there are given probabilities that these fundamentals may change in specific directions. If market participants have sufficiently strong beliefs that a given course of policy will not be followed, they may, in fact, make it impossible for the authorities to follow that course. Under flexible exchange rates, this problem may become acute because the exchange rate is so flexible a price and so much governed by expectations. It may well be argued, as was done in the discussion of the French stabilization experience under Raymond Poincaré, that speculators are the true judges of fundamentals and that a collapse of the exchange rate brought about by adverse capital flows is irrevocable evidence of a program of stabilization that was out of touch with

fundamentals. But such an argument must be viewed as simplistic by anyone who recognizes that stabilization policy has a wide range of indeterminacy.[8]

The third source of disequilibrium exchange rates can be explained using the analogy of bubbles. A bubble exists when holders of an asset realize that the asset is overpriced but are nevertheless willing to hold it, since they believe there is only a limited risk of a price collapse during a given holding period; therefore, asset holders expect to be able to sell eventually at a price that will provide them with sufficient capital gains to compensate them for running the risk of a collapse.[9] An analogous situation occurs when a currency has appreciated more than can be considered justified by fundamentals and overvaluation is widely thought to prevail, but appreciation is expected to continue until some disturbance causes the crash. There are no models of such a crash as yet, but it should be clear that an essential ingredient is the arrival of new information that diverts a sufficient number of speculators from keeping the bubble growing.

Bubbles, peso problems, and irrelevant information all move the exchange rate away from the particular equilibrium implied by current fundamentals. In each of these cases, there is a re-evaluation of beliefs. When this occurs, exchange rates change markedly, which, in turn, may force an accommodating change in policies. Unless policies are very exogenous, instability of policies may be provoked by instability of expectations. That means flexible exchange rates may require, as an institutional setting, that policies be more exogenous than, in fact, they are today. Without such an anchor, flexibility of exchange rates may aggravate macroeconomic instability.

II. Coping With Interdependence

In the late 1960s, discussion of international monetary arrangements centered on the idea of "flexing" the system. Exchange rates were too inflexible to be compatible with an overvalued dollar and the one-way street that overvaluation created for internationally mobile, speculative capital. Today much of the ex-

[8]See Flood and Garber (1982 a, 1982 b), Salant and Henderson (1978), Lizondo (1980), and Blanchard (1982) for discussions of regime changes.
[9]See Tirole (1982) and Blanchard (1979).

change rate debate starts from the recognition that it is desirable to reduce excessive fluctuations that exert undesirable interdependence effects. The quest then is for "flixed" exchange rates: the optimal exchange rate regime would prevent *persistent* overvaluation or undervaluation of a currency that would ultimately lead to protection or an undesirable monetary-fiscal policy mix. The rate system would also have to be flexible enough to yield *long-run* inflation autonomy. But, at the same time, short-run real exchange rate variability should be reduced and the export of inflation through appreciation limited. There is little question that a flexible exchange rate system has desirable long-run features and that these should not be readily sacrificed. But, at the same time, the short-run implications of unsynchronized policy actions are sufficiently severe to raise the question whether exchange rates are too flexible at present. That question, of course, can be answered by comparing arrangements with a set of alternative arrangements.

Three alternative methods of reforming the present system are (1) returning to fixed or quasi-fixed rates, (2) limiting the incentives to move capital, and (3) permitting limited exchange rate flexibility. Brief comments will be made on aspects of each of these.

A return to outright fixed exchange rates appears adventurous. Such a move would be difficult because of large discrepancies in inflation rates among key industrial countries. The willingness of major industrial countries to impose trade restrictions seems striking confirmation that these countries are not disposed to abide by rules. An outright commitment to peg would yield, at best, a variety of the European Monetary System. The difficulties posed by a fixed rate system are aggravated by the economic instability in at least two key industrial countries—the United States and the United Kingdom.

An alternative to fixed rates has been proposed by McKinnon (1982). He argues that exchange rate instability and the instability of world inflation are outgrowths of misconceived monetarism. The right kind of monetarism would look at the world quantity of money. Specifically, he argues (p. 331) that

> . . . the solution to international currency instability is straightforward: the Federal Reserve System should discontinue its policy of passively sterilizing the domestic monetary impact of foreign official interventions. Instead, a symmetrical nonsterilization rule would ensure that each country's money supply mutually adjusts to international currency substitution in the short

> run, without having official exchange interventions destabilize the world's money supply.

The basic premise of this prescription, and its flaw, is that it assumes that exchange rate instability is induced by shifts in the currency denomination of the public's money holdings—that is, by currency substitution. But surely international currency speculation is not carried out by shifts between different countries' M_1s (currency plus demand deposits) but by shifts between interest-bearing assets. The proposal also encounters the not negligible issue of the transition to low inflation in the United States. It certainly does not help to overlook the fact that inflation is significantly higher today in the United States than it is in Japan and the Federal Republic of Germany. As noted previously, however, monetary policy seeks to achieve a transition to low inflation, and it is the by-product of that transition that causes the real exchange rate havoc.

Proposals for more limited exchange rate flexibility take the form of intervention rules. They may either involve an exchange rate band (fixed or moving) with full intervention at the margin and none in between or an intervention rule that seeks to dampen exchange rate movements relative to some notion of a fundamentals rate.

Proponents of band proposals are reluctant to specify how the band would actually be set. They emphasize, as does Bergsten (1982, p. 11), that

> there is no suggestion here of a return to fixed exchange rates, nor even to seeking "correct rates" within narrow margins. It should be possible, however, to reach international agreement on the existence of "wrong rates"—as was indeed done in November 1978, and seems largely possible today. Rates could then be pushed back toward appropriate zones through direct intervention, alterations in domestic policies and public pronouncements.

One objection to an exchange rate band is that such an arrangement actually promotes exchange rate instability within the band. The presence of a band reduces risk to portfolio holders and, therefore, increases portfolio shifts in response to perceived changes in mean returns. Thus, given random movements in mean return expectations, there will be more exchange rate variability within the band than there would be without such limits and the greater risk of speculation. Moreover, it is not clear why a rate should be allowed to change dramatically, only to be pushed back afterward. If there can be agreement on what constitutes an exces-

sive exchange rate change, then there can be agreement on a limiting point. But, of course, this question is one on which national interests may differ, as was seen so clearly in the debate over the valuation of the U.S. dollar throughout the 1960s. It also stands to reason that authorities who take a view on what an excessive exchange rate change is will also take a view on what is too rapid a correction. Thus, intervention might dampen the correction of exchange rates and, in this way, reduce the risk of speculation, thus enhancing actual capital flows.

The basic objection to a band proposal is that it makes no sense to set limits for exchange rates but not for other key macroeconomic variables. Exchange rate targets without an accompanying, well-understood macroeconomic support program can hardly be expected to be effective. Macroeconomic policies geared exclusively to exchange rate targets rather than a broader range of targets—including real interest rates, the real value of corporate stock, inflation, and unemployment—may well lead to a deterioration of macroeconomic performance. In the absence of such a broader range of targets, one can only expect poor results from intervention policy, such as the results observed during the 1979 Carter period of overexpansion.

An alternative approach to limited exchange rate variability is based on the idea that it is possible to extract, at least approximately, from market data the sources of exchange rate disturbances. To the extent that these disturbances are portfolio shifts between currency denominations, they should be accommodated by intervention. This is the standard argument used in the literature about interest rate versus money stock targets. In that context, the rule is to peg interest rates, allowing money to vary if disturbances are primarily financial. In the present context, the rule is to stabilize exchange rates if disturbances are primarily portfolio shifts rather than events that require changes in the equilibrium real exchange rate. Specifically, if disturbances can unambiguously be identified as shifts between domestic and foreign currency debt, the appropriate policy is *sterilized* intervention that keeps the exchange rate as well as interest rates fixed. The same is true for portfolio shifts between home money and home securities, although in this case the maintenance of fixed exchange rates and interest rates would not require intervention.

When disturbances are both real and financial and identification becomes ambiguous, the case for rigid intervention disap-

pears. Formal models, in these mixed cases, suggest that managed floating becomes the optimal exchange rate regime.[10] The extent to which the exchange rate would be more nearly fixed depends on the relative variability of real and financial shocks, the authorities' concern with the composition of aggregate demand as well as the level of activity, the perceived durability of shocks, and the structure of the economy. The strong case that can be made for sterilized intervention when all disturbances are pure portfolio shifts is no longer valid, and few sturdy rules are available to guide policymakers.

Intervention policy cannot cope with the main source of exchange rate movements—namely, *divergent national monetary policies.* When money is tightened in one country to reduce inflation, the financial disturbance is, in fact, deliberately produced by the government in the hope of reducing inflation. Moreover, the initial real appreciation, because it reduces inflation, is a welcome part of the disinflation process. Intervention would mean forcing the monetary contraction on the rest of the world, even though cyclical conditions abroad might not call for tight money. Of course, the rest of the world might pursue tight money to stabilize the exchange rate but, at the same time, implement a fiscal expansion to maintain aggregate demand in the face of higher interest rates and lower net exports. This policy is open to the objections that fiscal policy is overused and that cyclical expansions can rarely be undone.

III. Concluding Remarks

The preceding discussion argues that active policy measures, as much as the business cycle itself, cannot fail to spill from one country into another, whatever the exchange rate regime. What the exchange rate regime does determine is the particular shape of the spillover—namely, whether it takes the form of a decline in employment with relatively unchanged competitiveness and inflation, or whether there are large changes in inflation and real exchange rates (and, therefore, in real income) but relatively smaller changes in employment. The effects of fixed and flexible rates differ markedly and are influenced by the domestic economic structure. Real wage rigidity has a particularly strong influ-

[10]See Henderson (1982) and Frenkel (1976).

ence on exchange rate effects. It is here that one has to recognize Robert Mundell's point that the case for flexible exchange rates rests fundamentally on money illusion, in the sense that real wage rigidity must be absent.

Flexible exchange rates can work well when financial disturbances are indentifiable and can be accommodated by the appropriate sterilized intervention and when, in addition, real disturbances can be accommodated by changes in real exchange rates that do not conflict with full employment. Even if neither of these two requirements is met, there are long-run benefits in using a flexible rate system. But there are also short-run costs, which may be quite high, that are brought about by the very fact that the exchange rate is too flexible. These short-run costs, in turn, are higher, the more fervently policymakers (mistakenly) believe that the use of flexible rates is tantamount to the achievement of macroeconomic independence. If many policymakers hold this erroneous view, the use of flexible rates may well have a destabilizing effect on the world economy. This was already recognized in the 1960s, as evidenced by the following statement made by the Government of the Federal Republic of Germany in 1964:

> Fixed exchange rates are an indispensable element in a world committed to integration; with a system of flexible rates the existing readiness to cooperate and integrate might be destroyed at the first appearance of serious difficulties since flexible rates would offer such an easy opportunity for isolated action.[11]

If flexible exchange rates, in the course of stabilization policy, lead to excessive real exchange rate changes, and if the latter are the source of adverse spillover effects, a reduction in incentives for international capital movements may be a remedy. The case for restrictions on international capital flows of one kind or another is old. Specifically, Modigliani argued

> ... there may arise a need, at least in the short run, for holding private capital movements in line with the achievable transfer of real capital. To achieve this goal, without outright limitations on the freedom of capital movements, countries could rely on general fiscal policy as one of the possible devices for influencing incentive to capital movements. But they should also be allowed to opt, just as freely, for the alternative approach relying on specific tax and related incentives, which, we have argued, is likely to be superior under most circumstances.[12]

[11]Quoted in Cooper (1968), p. 233.
[12]Modigliani (1973), p. 252.

The same view has been articulated by Tobin (1978) and Liviathan (1979).

The argument for specific taxes, often referred to as interest equalization taxes, to reduce the incentives for international capital flows, has been objected to on three grounds. The first, and most serious, is that such flows limit exchange rate movements and therefore imply a transmission of macroeconomic disturbances through the current account. A tight money policy in a large country would lead to a decline in real income worldwide, as would a regime of fixed exchange rates, thus avoiding the effects of exchange rate movements on real wages and on the price level. The second objection is that taxes on capital flows cannot work because they lead rapidly to all kinds of evasions, including the use of offshore markets. There is no doubt some truth to this argument, although its force is limited for transitory taxes, which would be appropriate during a period of divergent policy in a particular country.

The last objection to interest equalization taxes is that they interfere with the efficient operation of the world capital market. This argument is, in the opinion of the author, actually wrong. It mistakes the short-term money market rate for the social productivity of capital. Suppose a country reduces money growth and this leads (as it will) to an increase in the interest rate on financial assets. Incipient capital flows will lead to currency appreciation and a current account deterioration financed by borrowing abroad.[13] It is hard to argue that the current account deficit is a reflection of enhanced investment opportunities or increased time preference that, in an efficient and integrated capital market, would call for redirection of lending toward the home country. On the contrary, the decline in demand would reduce the profitability of domestic real capital. It therefore would not be optimal for capital to flow toward the country with a tightened monetary policy. Policy intervention, in these circumstances, could well enhance the efficiency of capital allocation in the world. Needless to say, not much research has been done on this topic.

Even if restrictions were imposed on capital flows, so that less adjustment took place through relative prices and adverse spillover effects on inflation, disturbances would still be transmitted through the current account. The simple fact is that whatever the exchange rate regime, real disturbances will be transmitted in

[13]See Dornbusch (1980) or Buiter and Miller (1981, 1982).

some form. This suggests that what should be sought is a policy mix that makes disinflation less of a real disturbance. The mix that is most frequently suggested consists of incomes policy and a monetary rule. Experience with incomes policy is not encouraging by any means. Nevertheless, it is widely held that a flexible exchange rate system without a firm anchor consisting of both monetary rules and effective supply side policies severely disrupts the established liberal world order based on economic growth and openness in trade and capital markets.

APPENDIX

Macro Model and Data Sources

Macro model

Combining equations (1) and (2) and using equations (3)–(5) and (7) leads to the following system of equations:

$$m - w - (1-\beta)\theta = h(f + a\theta - br^* - b\beta\dot{\theta}) - c(r^* + \dot{\theta} + \dot{w}) \tag{11}$$

$$\dot{w} = \gamma(f - br^* - b\beta\dot{\theta} + a\theta) + \alpha(1-\beta)\theta \tag{12}$$

which defines the rates of change of wages (in equation (13)) and of the real exchange rate (in equation (15))

$$\dot{w} = \{[(1-\beta)(b\beta(\gamma - \alpha h) - \alpha c) - a\gamma c]\theta - \gamma cf - \gamma b\beta(m-w) + \gamma cb(1-\beta)r^*\}/\Delta \tag{13}$$

By assumption,

$$\Delta \equiv b\beta(c\gamma - h) - c < 0 \tag{14}$$

and

$$\dot{\theta} = [(m-w) + (a(c\gamma - h) + (c\alpha - 1)(1-\beta))\theta + (c(1-b\gamma) + hb)r^* + (c\gamma - h)f]/\Delta \tag{15}$$

The slopes of the schedules in Figure 1 are given by the following two equations:

$$\left.\frac{dw}{d\theta}\right|_{\dot{w}=0} = \frac{(1-\beta)(b\beta(\gamma - \alpha h) - \alpha c) - a\gamma c}{\gamma b\beta} \tag{16}$$

and

$$\left.\frac{dw}{d\theta}\right|_{\dot{\theta}=0} = a(\gamma c - h) + (c\alpha - 1)(1-\beta) \tag{17}$$

The long-run solutions for wages and the real exchange rate are as follows:

$$\theta = (b\lambda r^* - \lambda f)/(1 + \alpha\lambda) \tag{18}$$

and

$$w = m + (c + b(h - \gamma/\alpha)\Big/(1 + a\lambda))r^* - ((h - \gamma/\alpha)\Big/(1 + a\lambda))f \tag{19}$$

and are obtained by setting $\dot{w} = \dot{\theta} = 0$ in equations (11) and (12).

Data sources

In Table 1, the cyclical variable is the OECD unemployment rate, which is available only as far back as 1964. The real oil price is measured as the dollar price of oil deflated by the U.S. GNP deflator. The terms of trade of the non-oil developing countries are measured by the ratio of export to import prices reported in the Fund's monthly publication, *International Financial Statistics* (see World Tables, "Export Unit Values," line 74d/country code 201 and "Import Unit Values," line 75d/country code 201). The real exchange rate for the dollar is reported in the same source (see World Tables, "Cost and Price Comparisons for Manufacturing," the relevant subsection of which is entitled "Relative Wholesale Prices").

The real materials price in equation (2) is the index of the prices of all commodities found on line 76ax of the "Commodity Prices" section of the World Tables in *International Financial Statistics,* deflated by the dollar export price of manufactures of industrial countries reported in the United Nations' *Monthly Bulletin of Statistics.* In equation (3), an index of 33 commodity prices is used. The index is prepared by the Commodities and Export Projections Division of the World Bank's Economic Analysis and Projections Department, and the most recent data are contained in Table 13 on page 31 of Grilli (1982). The indices for agricultural prices and the prices of the metals and minerals group are drawn from the same source.

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Comments

Ernesto Hernández-Catá

This commentary covers three topics briefly. The first relates to the model presented in the first section of Mr. Dornbusch's paper and some of its implications for the appropriate conduct of monetary and fiscal policies against the background of a tightening of monetary conditions in the United States. The second topic relates to the problem of modeling expectations in the context of uncertainty regarding the future of policies. The final topic relates to the external implications of monetary restraint in the United States.

The Dornbusch model suggests that a small, open economy with flexible exchange rates would experience a long-run decline in output and a long-run real depreciation of its currency as a result of a tightening of monetary policy in the rest of the world (referred to, for simplicity, as "the United States"). In addition, there would be an increase in consumer prices, partly because of the real depreciation of the domestic currency but also because the decline in the demand for money stemming from lower output and higher interest rates must be offset, in long-run equilibrium, by a decline in the real money supply.

The question one may ask is how, on the basis of the model, the small, open economy should adjust its macroeconomic policies in response to a tightening of monetary conditions in the United States. First, it can be noted that in long-run equilibrium, monetary policy in the small economy has no effect on domestic interest rates (which are determined by world interest rates) or on domestic output (which is fully determined in the goods and labor markets, as shown in Figure 3).[1] Domestic monetary policy does, however, influence the long-run behavior of domestic consumer prices through the money demand function. Thus, it might be argued that monetary policy in the small, open economy should be tightened in response to a rise in real interest rates abroad. Such tightening would prevent a permanent increase in consumer prices and would probably moderate any overshooting of the real exchange rate.

[1]By contrast, the assumption that a tightening of monetary conditions in the United States would result in a permanent increase in world interest rates implies that U.S. monetary policy *does* have long-run effects.

It can also be noted that an expansionary fiscal policy in the small country would stimulate domestic output and lead to a real appreciation of the domestic currency (in the language of Figure 3, a fiscal expansion at home shifts the IS schedule to the right). Thus, in terms of the model, fiscal expansion at home would appear to provide an offset to the effects of monetary restriction abroad. There are, of course, well-known practical problems with this prescription. Today, budget deficits are generally perceived to be excessive; a fiscal expansion would strain further the financial position of the government and might give rise to expectations of future monetization of the deficit.

Questions can also be asked about what would be the appropriate fiscal policy in the United States from the standpoint of its partners. In the Dornbusch model, fiscal policy abroad affects the small, open economy in two ways: (1) by changing world interest rates and (2) by changing external demand, thereby influencing the current account balance of the small country.

It is difficult to ascertain the net effect of these changes, because the structure of the U.S. economy is not specified in the Dornbusch model. Presumably, a tightening of fiscal policy in the United States would lower U.S. interest rates and lead to a worldwide reduction in crowding out. However, the net effect of U.S. fiscal policy on other countries would depend to a large extent on whether aggregate demand in the United States would ultimately rise or fall as a result of fiscal restraint. If aggregate demand were to decline in the United States (as it would if the effects of fiscal policy in that country were similar to those described in the context of the small economy model), there would be an adverse effect on the current account of the small country. The fall in external demand and the decline in world interest rates would affect output in the small country in opposite directions; therefore, the final outcome would depend upon the parameters of the model and could not be determined a priori. However, there is at least the possibility that the effect of lower demand in the United States could outweigh the effect of the decline in interest rates. Under this scenario, a fiscal contraction in the United States would aggravate the recessionary impact of U.S. monetary policy on the small country and would also result in a further real depreciation of the small country's currency.

Of course, it may be more realistic to assume that (beyond the short run) fiscal restraint in the United States would stimulate domestic output by improving expectations concerning the out-

look for monetary control and inflation. In this case, a tightening of fiscal policy in the United States would stimulate output and employment in the small, open economy. This result would be consistent with the widespread belief that action to cut the U.S. budget deficit would alleviate the adverse external effects of tight monetary policy in the United States.

Mr. Dornbusch remarks that "many of the disturbances in the world economy are not the result of actual changes in fundamentals," such as macroeconomic policies, "but rather of changes in expectations about the future course of these fundamentals."[2] He adds that when expectations are formed in certain ways, movements in exchange rates and other variables will not necessarily promote macroeconomic stability. For example, market participants may have the wrong model of fundamentals in mind. Expectations based on this erroneous model will affect the exchange rate and, as a result, the "exchange rate will be significantly more volatile than is warranted by the true model."[3]

An equally serious problem for both the model builder and the policymaker is that, under certain circumstances, it may be impossible for market participants to know what the "true model" is. Suppose that market participants are well informed and have adequate knowledge of the various structural relationships that govern the behavior of the private sector. Suppose further that the monetary authorities have announced their intention of bringing down the growth rate of the monetary aggregates with the aim of reducing inflation. Even if market participants are convinced that the authorities are willing (and technically able) to pursue the policy that has been announced, they might be uncertain as to how long the government will continue to support the policies of the central bank in a context of rising unemployment. Specifically, market participants might reasonably assume that there is a "politically unbearable rate of unemployment" at which the government will stop supporting monetary restraint and will exert pressure on the central bank to relax monetary policy.

For the model builder, the problem is that the "politically unbearable" unemployment rate, a key parameter of the model, is unknown and cannot be estimated on the basis of historical information. At best, individuals can form judgments as to what kinds of political pressures are likely to arise and as to how the govern-

[2]See p. 18.
[3]See p. 19.

ment will react to such pressures; but it is clear that judgments of this kind will be very difficult to make.

Under such circumstances, market participants are likely to assess monetary policy by focusing on deviations of monetary growth from the announced target. As unemployment rises, any initial estimate of the "politically unbearable" unemployment rate will be revised upward if, and only if, monetary expansion remains at or below the target rate for a significant period. According to this scenario, expectations about underlying inflation will adjust only slowly—as doubts concerning the persistence of monetary restraint are dispelled by actual performance—and monetary policy will have adverse effects on output and employment. This expectational mechanism resembles the backward-looking adaptive expectations scheme used in many econometric models. This is the case not because individuals believe that the future is necessarily the mirror image of the past, but because they do not know whether or when the authorities will cave in under pressure.

Ultimately, if monetary restraint persists, those who have based their behavior on the assumption that inflation will continue will suffer, not necessarily because they were "fooled" or because they did not use existing information in an efficient way, but because the parameters of the decision-making process could not be known in advance. Conversely, failure to persevere in the effort to reduce monetary growth would seriously undermine any future stabilization attempts, as it would convince market participants that there is a critical unemployment rate above which the government will stop supporting monetary restraint and will call for a relaxation of policy.

In Mr. Dornbusch's paper, a long list of ills is attributed to monetary tightness in the United States during the past several years. Monetary restraint in the United States causes high nominal and real interest rates and increases unemployment abroad, even in long-run equilibrium; it leads to exchange rate overshooting and causes the currencies of U.S. trading partners to depreciate in real terms, thus raising consumer prices abroad. Furthermore, a tightening of monetary conditions in the United States worsens the current account balances of developing countries by raising the interest payments on their external debt; it also hurts developing countries by depressing the prices of commodities relative to manufactured goods prices through a reduction in demand in industrial countries and an appreciation of the U.S. dollar.

There is no doubt that the policies aimed at reducing inflation in the United States have had effects on other countries. However, the effects have not been unequivocally damaging. For example, the real appreciation of the dollar has reduced the competitiveness of U.S. exports, thereby contributing to an improved current account performance by other countries (particularly those that export largely manufactured goods). Moreover, while it is true that monetary restraint in the United States has contributed to a decline in the real prices of commodities, it would appear that in some cases (petroleum, for example) the decline has been greeted with relief in many countries, developing as well as industrial.

More fundamentally, it should be noted that without a lasting reduction in inflation, there is little hope for significant improvements in the long-term growth of productivity and output in the United States—improvements that are clearly important to the rest of the world. Mr. Dornbusch is correct in stating that a move toward fixed exchange rates would be complicated by policy instability in major countries, and it should also be recognized that such instability is impairing the functioning of a flexible exchange rate system. It is precisely for this reason that the restoration of price stability in the United States would be a major contribution to the stability of the world economy.

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As regards the traditional debate on the relative merits of floating versus fixed exchange rates, Dornbusch argues quite clearly and convincingly that floating exchange rates are desirable and useful for accommodating and permitting differences in trend inflation rates and differences in trend rates of productivity growth between countries, but that they are not a means of insulating a country against external shocks, let alone a means of avoiding external spillovers from domestic policy changes. So, from the point of view of a single country operating in a given world system, the question of fixing versus floating reduces to a variant of the price versus quantity argument, and some form of managed float will obviously be optimal, with precise specification of the rule depending on 750 different parameters. Again, no clear-cut evidence for or against the current regime emerges.

Both fixed rate and floating rate regimes require rules of the game with respect to domestic monetary and budgetary policies in order to operate well. The merit of a floating rate regime is that when the rules of the game are not followed, fixed rate regimes break down while floating rate regimes simply perform poorly but continue to operate. Consequently, industrial countries will be stuck with some measure of exchange rate flexibility for the foreseeable future, given the lack of policy convergence.

When the Dornbusch paper talks about interdependence, it refers to national economies as "coupled," interacting systems. This is structural or model interdependence. An equally important form of interdependence is, of course, strategic interdependence. Dornbusch is most explicit about this. His statement that national policy autonomy must be accepted as a fact amounts to saying that noncooperative or, at best, only partly cooperative behavior by the players in the international arena must be taken as given. Dornbusch goes on to analyze various domestic policy responses to exogenous foreign policy shocks, as well as domestic policy design with foreign policy design and foreign policy rules taken as given.

There are positive and normative assumptions implied by describing policymaking in the international economic system as a noncooperative, non-zero-sum Nash game in which countries take the rest of the world's actions as given. While this description may be accurate for a number of small and medium-sized countries, it is clearly not accurate for the United States, which is more of a Stackelberg leader in the international arena. Therefore, a positive theory of strategic interdependence has to be developed in addition to the theory of model interdependence simply to make sense of the data and to interpret the time-series records presented in the Swoboda paper. This positive theory is needed to enhance analysts' understanding of how countries respond to each other's policy actions and of what games are really being played. Of course, at the normative level, a theory of strategic interdependence is needed to facilitate the design of feasible cooperative schemes and rules of the game that may enhance the performance of the system as a whole. International organizations like the Fund aim to do just that, in order to enable the international economy to achieve some of the potential gains that cooperation promises. Presumably, international economic interaction is not a zero-sum game, even though it is frequently played as if it were.

Some brief comments on the formal model presented in the

Dornbusch paper are in order. The main difference between the analysis contained therein and the familiar Dornbusch analysis is that the former adds real wage rigidity to the latter's nominal wage rigidity. One implication—an important one—is that real shocks, such as changes in world trade, in world interest rates, and in domestic fiscal stances will now have long-run effects on real output and employment. This change in the model is an important one, because it really alters the apparent attractiveness of the real interest equalization tax, which is mentioned in the Dornbusch paper as one means of trying to prevent undesirable real exchange rate overshooting in the international economy. Clearly, if there are only nominal shocks and nominal rigidity in the economy, then a real exchange rate equalization tax that prevents unnecessary change in the real exchange rate will be a sensible second-best policy, provided it can be implemented. However, real shocks in the international economy that require changes in the equilibrium real exchange rate and real wages if full employment is to be maintained should not be countered with a real interest rate equalization tax. The discussion in the Dornbusch paper, especially that concerned with Figure 2, is illuminating in this regard. After there is an increase in world interest rates, there is either an overshooting of the real exchange rate or of unemployment. In a way, the real exchange rate absorbs part of the shock that might otherwise fall on unemployment. Introduction of a real interest rate equalization tax, which in the model is also a real exchange rate stabilization tax, might well lead to higher unemployment.

Another important distinction is very similar to one drawn in the labor market literature between the real product wage relevant to employers and the real consumption wage viewed by workers. When the Dornbusch model talks about real interest rates, it is apparently referring to real intereat rates as viewed by consumers. During the adjustment process, as has been witnessed recently in the United Kingdom, the real interest rate as viewed by consumers—by lenders, in other words—is very different from the real interest rate as viewed by producers, especially by producers in the internationally exposed sector of the economy. These producers, after all, will have to repay their borrowing out of the proceeds from sales of goods that do not follow the same trend as the general inflation rate but instead follow the trend of the inflation rate of internationally traded goods prices. Thus, a huge wedge can open up between consumers' and producers' real interest rates.

The points Dornbusch makes about the volatility of foreign exchange markets and about bubbles, pesos, and runs are very well taken. It gives one very little comfort to know that asset market prices fully reflect all available information, if part of that information is of the sunspot, Henry Kaufman, or other nonfundamental variety. More widespread use of capital controls may, indeed, be the only feasible way of preventing these kinds of disequilibrium changes in the real exchange rate from disrupting the international economy. There is a tendency to confuse the notion of informational efficiency of markets, in the narrow technical sense, and the notion of economic, or allocative, efficiency. Information efficiency simply means that nobody can systematically make a risk-adjusted profit that is above normal. Allocative efficiency relates to the way in which markets expand the consumption possibilities set and determine the economy's position in it. Dornbusch rightly focuses on the allocative efficiency of markets.

An examination of the European response to high U.S. interest rates may serve to illustrate some of Dornbusch's observations on this subject. If there is something in the Mundell view that expansionary monetary policy in a floating-exchange-rate world with capital mobility is a beggar-my-neighbor policy, then appreciation of the U.S. dollar, which corresponds to depreciation of European effective exchange rates, should be welcomed by Europeans as an offset to the contractionary influence of U.S. tight money on European effective demand. The last thing, therefore, one should do in Europe is try to stabilize the exchange rate by raising interest rates and tightening money as the United States is doing. If a depreciating exchange rate, however, has no expansionary effect on European production—say, because there is absolute real wage resistance—then there will be only the inflationary consequences, and European countries might as well allow their interest rates to follow U.S. interest rates upward.