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"The dramatic surge in the dollar's value relative to major European currencies was probably the most important economic event of the period between 1980 and 1984."
Martin S. Feldstein (1986, p. 355)

"As for foreign exchange, it is almost as romantic as young love, and quite as resistant to formulae."
H.L. Mencken, Prejudices vol. IV

1. Introduction

Mencken's prescient comment foreshadowed considerable controversy among economists on the meaning of exchange rate changes and failure of all the theoretical models of exchange rates that have lent themselves to straightforward empirical tests. Because of the widespread perception that exchange rates and the current account are of major importance to the U.S., and the world, economy -- and the proper objects of wise public policy -- this poses a challenge to the formulation of such a policy.

This paper discusses the connections between exchange rates, the current account of the balance of payments, and the formulation of monetary policy. I summarize theoretical models and related evidence, and I conclude that -- in the current state of knowledge -- monetary policy should be conducted on the basis of domestic objectives and that exchange rates and the current account should play little role in its formation.

Section 2 summarizes the major issues regarding the role of exchange rates and the current account in the formulation of monetary policy. Section 3 discusses alternative models and evidence. Section 4 concludes with a discussion of policy formation under uncertainty.

2. The Issues to be Addressed

There are six reasons why exchange rates and the current account might appropriately play important roles in the formation of monetary policy.

(1) The exchange rate or current account might be a target of monetary policy because it plays a key role in the determination of aggregate output and employment. (The nominal exchange rate might be a good proxy for the real exchange rate because real and nominal exchange rate changes are highly correlated.)

(2) The exchange rate might be an ultimate target of monetary policy because its stability *per se* is desirable -- for the same reasons that general nominal price level stability is desirable (whatever those reasons are). According to this argument, the nominal exchange rate is itself a very important price, and consequently should be an ultimate target of monetary policy (along with other nominal prices).

(3) The exchange rate and current account might be useful indicators of economic conditions that affect the appropriate monetary policy. The argument here is not that the exchange rate

or current account is an ultimate target, but that they provide useful information to policymakers. A currency depreciation might, for example, indicate a fall in the demand for money or a change in the supply of inside money. It might increase the probability that higher inflation will follow, and may warrant a monetary-policy response. Alternatively, because real disturbances to aggregate supply or demand can change real and nominal exchange rates and the current account, these changes may provide policymakers with important information about those disturbances. Finally, if monetary policy affects real aggregate demand or supply, the response of exchange rates and the current account may provide information about these effects and aid the formulation of future policy.

(4) Exchange rate fluctuations, unpredictability, or "misalignments" might cause resource misallocations (including unemployment, lower economic growth, or protectionist pressures). Monetary policy might be able to reduce the size of these fluctuations, make them more predictable, or reduce the size of "misalignments." It could therefore reduce the degree of resource misallocation. The appropriate monetary policy might involve a formal rule such as pegged exchange rates or "target zones" for exchange rates, or perhaps for official foreign-exchange-market operations such as sterilized intervention.

(5) Monetary policy that reduces exchange rate fluctuations, unpredictability, or "misalignments" might increase the prospects for international coordination of policies in ways that would

facilitate the pursuit of some policy goal (such as unobstructed international trade, full employment, greater economic growth, or lower or more predictable inflation rates).

(6) Rules such as pegged exchange rates or "target zones" for exchange rates might provide desirable and enforceable constraints on monetary policy. These constraints might reduce uncertainty and facilitate efficient resource allocation and the achievement of other policy goals.

This paper discusses these suggestions for monetary policy in light of alternative theories and evidence on the behavior of exchange rates and the current account.

3. Models of Exchange Rates and the Current Account

This section begins with a discussion of the simple monetary model of exchange rates with flexible prices, turns to the equilibrium model of exchange rates and the current account, and then to sluggish-price (disequilibrium) models. I discuss the implications of each type of model for monetary policy. I argue that, in the current state of knowledge, exchange rates and the current account should play little role in the formation of monetary policy.

3.1 The Simple Monetary Model

Many models of exchange rates are variations on the simple monetary model, with either flexible prices or sluggish nominal prices. The basic monetary model assumes purchasing-power parity to express the exchange rate as a ratio of price levels in two countries, and replaces the price levels with equilibrium solutions obtained from equating money supply and demand in each country. Because money demand is affected by expected inflation, and expected inflation is connected to expected currency depreciation through the purchasing-power parity assumption, this substitution implies that the current exchange rate depends on the expected future exchange rate as well as current nominal money supplies and variables, such as real income, that affect money demands. The resulting stochastic difference equation can be solved forward to obtain a solution for the exchange rate in terms of current and expected future values of nominal money and variables such as real income. With the assumption of rational expectations, statistical predictions of these future values can be substituted for the expectations, and the result is a solution for the exchange rate in terms of currently observable variables. The model is reasonably simple to work with, and it has been applied to a variety of issues such as balance-of-payments crises and devaluations as well as exchange-rate determination.[1]

The main problem with the flexible-price versions of the simple monetary model is their reliance on purchasing-power-parity. As a result, they are unable to explain the observed high correlation between real and nominal exchange rates (in levels or rates of change),[2] and high variability of nominal exchange rates relative to ratios of nominal price indexes.[3] The inability of the simple monetary model with flexible prices to explain these basic and important observations suggests that it is a poor model with which to formulate policy.[4]

3.2 Equilibrium Models of the Exchange Rate and Current Account

These problems vanish if multiple traded (and perhaps nontraded) goods are added to the flexible-price monetary model. This modification, with multiple goods and real disturbances to tastes or technologies, results in "equilibrium models" of exchange rates and the current account. The equilibrium models are dynamic stochastic general equilibrium models usually based on individual optimization. One feature of these models that makes them attractive for policy analysis is that they can overcome Lucas's critique of econometric policy evaluation. Not all of the alternative models discussed below share this feature. This is an important consideration in determining the fitness of various economic models for evaluating monetary policy. I now summarize the equilibrium approach.

Economic theory predicts that real disturbances to supplies of goods or demands for goods (due to changes in technology, tastes, or changes in other exogenous variables such as fiscal or trade policies) change equilibrium relative prices, including the "real exchange rate". In a wide variety of circumstances, these changes in the real exchange rate are partly accomplished through changes in the nominal exchange rate. The real disturbances also change real quantities such as production, consumption, investment, saving, and the current account.[5] Repeated real disturbances create a correlation between changes in real and nominal exchange rates. This correlation is consistent with flexible-price equilibrium in the economy, in the sense that markets clear through price as well as quantity adjustments. This is the basis for the equilibrium approach to exchange rate changes, the main features of which are summarized in Stockman (1987).[6]

To illustrate the effects of real disturbances on the exchange rate, consider a simple example. Two countries with a flexible exchange rate, the home and foreign countries, produce wheat and rice. The government of the home country operates its monetary policy to hold constant a price index that includes the nominal prices of both goods. The foreign government does the same thing with a foreign price index that differs from the domestic price index because foreigners consume more rice and less wheat. Suppose the supply of wheat increases, so its relative price falls. Because nominal price indexes are held fixed by monetary policies in each country, the exchange rate must change to depreciate domestic money. (In an extreme case, the home price index includes only wheat and not rice, and the foreign index includes only rice and not wheat. Then the home nominal price of wheat and the foreign nominal price of rice would be unaffected. The entire change in the relative price would occur through a change in the exchange rate.) Alternatively, suppose a taste change reduces the demand for wheat and raises the demand for rice. The relative price of wheat must fall as before, and this must occur through a domestic currency depreciation. The main points are that real disturbances can change the exchange rate, induce comovements in real and nominal exchange rates, and cause changes in exchange rates that are large relative to changes in nominal price indexes. These conclusions generalize easily to richer and more complex models (and do not require monetary policies resembling those in this simple example). The equilibrium model of exchange rates can explain, in principle, a number of observed features of exchange-rate behavior. These features include a high correlation between real and nominal exchange rates and high variability of nominal exchange rates relative to nominal price levels.

The equilibrium approach also has implications for the current account of the balance of payments. The current account reflects intertemporal trade. It therefore reflects the results of disturbances that affect savings or investment, that is, many of the same real disturbances that change exchange rates. These disturbances include current and expected future changes in productivity, investment opportunities, factors affecting consumption (such as wealth and interest rates), government purchases, and tax rates. Large swings in the current account and the exchange rate can occur in competitive equilibrium without any distortions or externalities that might warrant corrective government policies. These swings may be required for an optimal response of the economy to exogenous disturbances, including changes in government policies. Whether the observed behavior of the current account and exchange rate in fact represents optimal responses to these changes is, of course, another question. And, if not, whether monetary policy can be helpful, and in what way, is still another question. But the observation, by itself, of large swings in the current account and exchange rate does not imply the existence of distortions that might be rectified by government policies.

Most of the existing equilibrium models involve Pareto-optimal equilibria. As a result, there is little role for government policy in the models. That is not a necessary characteristic of those models: the equilibrium in Stockman (1980), for example, is not Pareto-efficient because asset markets are incomplete. Activist government policies could in principle be designed to improve welfare in that economy. The typical absence of distortions in the equilibrium models is not meant to imply that, there are no market failures or roles for government policies, including monetary policies, in the real world. There may be market failures that warrant a number of "activist" policies. The remarkable result of the existing equilibrium models, however, is that no such market failures must be introduced into the models in order to account for key qualitative features of the behavior of exchange rates and the current account. Moreover, as I will argue, there is evidence to suggest that these models account for the behavior of exchange rates better than alternative models that explicitly involve distortions.

The equilibrium model without market failures has several important implications. First, the correlation between nominal and real exchange rates is not exploitable by monetary policy: attempts to affect the real exchange rate by changing the nominal exchange rate through foreign exchange market intervention, managed floating, pegging the exchange rate, or devaluation under a system of pegged rates, will fail. The correlation is a result of real disturbances to the economy. Purely nominal disturbances would, without market failures, have purely nominal effects. Only when a nominal policy such as managed floating or devaluation is accompanied by other, real, policy changes such as changes in capital controls, will the real exchange rate move with the nominal exchange rate. Of course, purely nominal changes could affect real output and other real variables if there were some market failure such as price sluggishness, and may do so in the real world. Equilibrium models of exchange rates are good models to the extent that these real effects of money do not explain a large fraction of exchange rate variations, and to the extent that the real disturbances, emphasized by these models, do.

Second, there is no simple relation between the exchange rate and the balance of trade or the current account of the balance of payments. Trade deficits do not "cause" currency depreciation, nor does currency depreciation help reduce a trade deficit. The direction of comovement of the exchange rate, the current account, and other variables depends on the source of disturbance. For example, a temporary increase in the demand for domestic goods accompanied by a fall in the demand for foreign goods and all goods in the future (a fall in savings) causes currency appreciation associated with a current account deficit. On the other hand, a temporary increase in the demand for foreign goods accompanied by a fall in the demand for domestic goods and all future goods (a fall in savings) causes currency depreciation along with a current account deficit.

It is frequently claimed that a current account deficit requires a currency depreciation. This claim is incorrect, according to the equilibrium models. Whether a current account deficit requires currency depreciation depends on the source of disturbance that caused the deficit. Suppose that the domestic savings rate is temporarily low, perhaps because of demographic factors. This will cause a current account deficit. Suppose also that the higher domestic expenditure falls primarily on U.S. goods, leading to dollar appreciation. Then when the savings rate later returns to its original level, the fall in spending would be accompanied by domestic currency depreciation. On the other hand, suppose that the current account deficit were due to a temporary increase in the demand for foreign goods, accompanied by a fall in the demand for domestic goods and all future goods. Then the eventual elimination of the deficit would be accompanied by currency appreciation.

Suppose, for example, that the demand for US goods initially rises, accompanied by a reduction in the demand for foreign goods and a reduction in savings. This would cause a US current account deficit and dollar appreciation. Suppose that, subsequently, demand shifts from US to foreign goods. Then the dollar will depreciate without eliminating the current account deficit. Suppose, finally, that the domestic savings rises again to eliminate the current account deficit. Then the exchange rate could either rise or fall. The domestic currency would depreciate if the greater spending falls mainly on domestic goods, but it could appreciate if the rise in spending is accompanied by a reversal of the previous demand shift from US to foreign goods. The usual claim that a current account deficit must be followed by depreciation results from the implicit assumptions that changes in overall spending are biased toward home goods - which is true on average though not necessarily in all cases - and that these changes are not accompanied by relative shifts in demand for home versus foreign goods that would offset this average tendency. As noted above, these implicit assumptions rule out certain exogenous disturbances a priori, such as a temporary increase in the demand for foreign goods accompanied by a fall in savings.

Third, government spending affects real and nominal exchange rates through its effects on relative demands and supplies of goods. Changes in government spending, financed by lump-sum taxes, change the real exchange rate to the extent that marginal spending propensities (on home and foreign goods) of the government and private sector differ.

Similarly, changes in tax rates change relative demands and supplies of goods. A reduction in the tax rate on investment, for example, raises the demand for investment goods, and this may fall disproportionately on domestic rather than foreign goods. Changes in tax revenue must be accompanied either by changes in government spending currently or in the future, or by offsetting future changes in taxes. Consequently, the effects of a tax change depend on what other changes accompany it. In addition, the effects of tax changes depend on both the wealth effects of changes in average tax rates and the substitution effects of changes in marginal tax rates. Under the conditions for Ricardian equivalence, a fall in the average tax rate today accompanied by an offsetting rise in the future average tax rate has no effect on resource allocation or prices. However, a reduction in the marginal tax rate today, even if the average tax rate is unaffected, affects resource allocation. A reduction in the average tax rate accompanied by a reduction in the present value of government spending affects resource allocation and prices regardless of whether Ricardian equivalence characterizes the economy.

Consider a reduction in the average tax rate accompanied by either a reduction in the present value of government spending or higher future taxes in the absence of Ricardian equivalence. Suppose that consumers in each country have a higher income elasticity of demand for their own country's goods than for those of the other country. Finally, suppose that (if government spending changes) consumers in each country have a higher income elasticity for their own country's good than does their government. Then a tax cut in the United States raises the demand for U.S. goods relative to foreign goods. This causes dollar appreciation to raise the relative price of U.S. goods.

Similarly, a reduction in the marginal tax rate on investment (given the average tax rate) raises investment. Suppose that changes in investment expenditure in each country fall relatively more on that country's goods than on the other country's. Then a reduction in the marginal tax rate on investment in the U.S. raises the demand for investment goods, and particularly that for U.S. goods. This causes dollar appreciation and raises the relative price of U.S. goods.

Fourth, government budget deficits (given the present value of government spending) can affect the current account and real and nominal exchange rates if Ricardian equivalence does not characterize the economy.[7] The reduction in savings associated with the tax cut shows up as a current account deficit. A budget deficit does not necessarily cause currency appreciation even if it causes a current account deficit. The domestic currency appreciates if the increased spending by domestic households falls, at the margin, mostly on domestic goods. In the opposite case it depreciates.[8]

Fifth, the dynamics of real and nominal exchange rates are related and can take a variety of forms.[9] The real and nominal exchange rates will be highly autocorrelated -- and look very much like random walks -- if the underlying disturbances tend to be permanent in nature. Observed real exchange rates have this characteristic, as discussed below. Prescott (1986) and others who have studied the productivity shocks required to replicate features of the real world in real business cycle models have typically found that underlying productivity shocks are highly persistent and closely approximated by random walks. So the assumption of permanent, or highly persistent, exogenous disturbances may not be a bad one.

Sixth, arbitrage ensures that the expected percentage real exchange-rate change between two countries is equal to the difference between expected real interest rates in those countries. Expected real interest rates may differ even if nominal interest rates are related to each other by interest-rate parity (another arbitrage condition) because price deflators differ across countries. In other words, the word "real" refers to a different bundle of goods in each country. Any difference between the expected own-returns on these two bundles of goods is reflected in an expected change in their relative price -- the real exchange rate. If disturbances affecting the real exchange rate have large transitory components, then a large fraction of real exchange-rate changes would be associated with these real-interest differentials. If the disturbances are mainly permanent, then only a small fraction of real exchange-rate changes would be associated with international real-interest differentials.

The evidence on equilibrium exchange rate models suggests that they should be taken seriously even though there are gaps in the evidence at present -- mainly associated with the absence of a fully convincing identification of the fundamental exogenous disturbances. The models can, however, account for a number of important features of the data such as high correlation between real and nominal exchange rates, and greater variability in exchange rates than in purchasing-power-parity price ratios.

There are other features of exchange rate data that a satisfactory model should explain. Expected changes in exchange rates are small relative to unexpected changes. Changes in real exchange rates tend to be nearly permanent (on average), or to persist for very long periods of time. This is consistent with the view that most changes in real exchange rates are due to real shocks with a large permanent component. Because changes in real and nominal exchange rates are very highly correlated and have similar variances, it is also consistent with the view that most changes in nominal exchange rates are due to largely permanent real disturbances. These features of exchange rate behavior place restrictions on the disturbances in equilibrium models.

The question of whether most changes in exchange rates are due to changes in long-run real exchange rates, as the equilibrium models with permanent disturbances imply, or to short-run real interest differentials, as the model with transitory disturbances (and some other models discussed below) imply, was addressed econometrically by John Campbell and Richard Clarida (1987). Their results are summarized in Table 1.[10] They found that most of the variation in the exchange rates between the U.S. and Canada, the U.K., Germany, and Japan, is due to changes in the long-run equilibrium real exchange rate. The first column of the table shows the fraction of real exchange rate innovations attributable to expected real interest rate differentials. The second column shows the fraction attributable to changes in the long-run equilibrium real exchange rate. The third column shows the fraction that could be attributed to either of the first two columns, due to their covariance. Even if the explanatory power of the covariance is apportioned so as to maximize the fraction of real exchange rate innovations attributable to expected real-interest differentials,[11] the table shows that those numbers range from 2% to 27%, except for the trade-weighted dollar, where that fraction for the second model reaches 42%. The fraction attributable to changes in the long-run equilibrium real exchange rate is, on the other hand, at least 73% to 98%, except in the last row where it may be as low as 58%.

The issue of permanent and transitory components in real-exchange rate changes has also been investigated by Huizinga (1987) and by Kaminsky (1987). Both studies found that real exchange rates are nonstationary with both permanent and transitory components. Huizinga found that the variance of the permanent component accounts for about one-half to three-fourths (the average estimate was .58) of the variance of U.S. dollar real exchange rate changes over the period since 1973, assuming that covariances are taken from as far back as eleven years.[12] Monte Carlo evidence by Galan (1988) and Kaminsky (1987) suggests that the kind of procedure Huizinga used results in systematic understatement of these numbers in small samples, so there is reason to believe that the number 58% substantially understates the true fraction of the variance of real exchange rate changes accounted for by the permanent component.[13] For bilateral British pound exchange rates against other currencies, Huizinga's results are similar to those for the U.S., but for bilateral Japanese yen exchange rates, the permanent component explains 100% of the variance of changes in the real exchange rate (except against the U.S. dollar, where 77% is explained by the permanent component).

Kaminsky (1987) obtained similar results for other currency pairs. In addition, she found that real exchange rates between the U.S. and Germany, Britain, and Japan, and the non-U.S. cross-rates, are cointegrated with a set of possible "market fundamentals" including real outputs, accumulated trade balance surpluses as a fraction of output, and accumulated government budget deficits as a fraction of output, the price of oil, and Britain's oil output. One implication that Kaminsky draws from her econometric study is that the disturbances affecting exchange rates have been predominately real rather than monetary.[14] A second implication of this evidence is that it is inconsistent with the view that exchange rate changes result from a class of "rational bubbles."[15]

The finding that most of the variation in real exchange rates can be attributed to a permanent, long-run equilibrium component, should not be taken to imply that transitory disturbances are unimportant. As noted above, current account deficits and surpluses reflect intertemporal trade. The existence of large current account deficits is itself prima facie evidence that there are either important transitory disturbances or permanent disturbances that are partly anticipated in advance. In either case, one can expect that these would be associated with some transitory components in real exchange rates. Whether or not these transitory components represent efficient equilibrium dynamics is more difficult to ascertain.

The equilibrium models have, as noted above, implications regarding the effects of fiscal policies. The models imply that changes in tax rates affect exchange rates through their effects on demands for goods (and supplies of goods). One possible explanation for the appreciation of the U.S. dollar from 1980 to 1985 is the reduction in tax rates in 1981 (which was partly anticipated with the 1980 election results). The increase in corporate investment taxes with the 1986 tax act (which was partly anticipated from the end of 1984) may play a major role in the explanation of the depreciation of the U.S. dollar since 1985.

Longer-term evidence supports this suggestion. Vittorio Grilli (1987) examined the exchange rate between the U.S. dollar and the British pound from 1870 to 1984. He found that a reduction in U.S. taxes relative to GNP leads to dollar appreciation over this period, and a reduction in British taxes relative to GNP leads to dollar depreciation. In contrast, the ratio of the budget deficit to GNP had no effect on the exchange rate.[16]

A more commonly asserted reason for dollar appreciation from 1980 to 1985 was the U.S. government budget deficit per se.[17] By now, that explanation seems strained because of the fall in the value of the dollar from 1985 to 1988 in the face of very little change in the current or prospective budget deficit situation. There is also some other evidence against this hypothesis. First, there is the (mixed) evidence supporting the Ricardian equivalence hypothesis (see, for example, Evans, 1987a,b). Second, there is little evidence that budget deficits are connected with changes in exchange rates.[18] Those empirical studies that find effects of budget deficits on exchange rates typically fail to distinguish between the effects of deficits and the effects of current and expected future government spending. (One must hold fixed both current and expected future spending to have a Ricardian experiment.) In fact, there is some evidence that changes in real government spending affect the real and nominal exchange rates.[19] Third, as Campbell and Clarida (1986) point out, most models imply that the effects of a temporary government budget deficit on today's real exchange rate and on the long-run equilibrium real exchange rate are in opposite directions. That is, the budget deficit raises the domestic interest rate and induces currency appreciation. But the long-run effect of the deficit is to reduce domestic wealth and therefore cause long-run depreciation. (This occurs because the long-run stock of accumulated foreign debt must be serviced through a trade surplus, which requires a lower price -- real depreciation -- to achieve, that is, because the fall in long-run domestic wealth reduces domestic expenditure, and this falls disproportionately on domestic goods.) So if temporary government budget deficits were responsible for the dollar appreciation of the 1980s, the correlation between innovations in the real exchange rate and the long-run equilibrium rate should be negative. This correlation is reported as C* in Table 1. It is not negative; instead, it is strongly positive for all of the exchange rates examined. This evidence casts doubt on the hypothesis that government budget deficits play a major role in explaining changes in real exchange rates.[20]

The main implication of the equilibrium models for monetary policy is that, if those models are good approximations of the actual economy, we have little basis for conducting monetary policy in ways that depend heavily on exchange rates or the current account. While changes in exchange rates and the current account may be related to changes in aggregate output, there is no correlation between them that is exploitable by monetary policy. While the exchange rate and current account could in principle provide information to policymakers about disturbances to tastes or technology that might bear on the optimal monetary policy actions, in the present state of knowledge there is little information to be obtained from these changes.

This leaves two other possible roles for monetary policy in the equilibrium models. First, the exchange rate might be an ultimate target of monetary policy because stability in the exchange rate might be desirable *per se*. However, the usual reasons for concern about nominal prices do not justify concern over the prices of particular items but, rather, over general nominal-price stability. While the exchange rate (multiplied by foreign nominal prices) is one component of this general price level, the proper focus would be on the general price level itself. Moreover, if the underlying disturbances to the economy are real, then stability in the nominal exchange rate may be inconsistent with stability in the overall level of prices. If stability of the latter is the goal, then optimal policy involves allowing the exchange rate to adjust endogenously.

Second, rules such as pegged exchange rates or "target zones" might provide useful constraints on monetary policy. There may be important reasons to constrain monetary policymakers. But it is not clear that a particular system of exchange rates is a better method of constraint than many alternatives, such as a constitutional rule on money growth rates or a rule specifying a target value for a more general index of prices. In the presence of large real shocks (which, I have argued, characterize the data), a rule of this form could constrain monetary policymakers to choose (implicitly) inflation rates that are nonzero on average and highly variable. There are surely better ways to constrain policymakers.

3.3 Sluggish Nominal Price Adjustment

An alternative "disequilibrium" model of exchange rates results from the assumption of sluggish nominal price adjustment. The problems with the simple monetary model of exchange rates can be "solved" by assuming nominal price sluggishness, though new problems replace them. With sluggish nominal prices in the model, even purely nominal disturbances can change the real exchange rate because the nominal exchange rate changes rapidly while price levels do not. The model predicts that real and nominal exchange rates are highly correlated, and that nominal exchange rates vary more than do nominal price levels. The model can result in "overshooting" of the exchange rate, as in Dornbusch (1976), in which the short-term response of the exchange rate to an exogenous disturbance exceeds its long-term response. Whether the particular version of the model results in overshooting, these models generally imply that the nominal and the real exchange rate exhibit predictable (intrinsic) short-term variations. The change in the real exchange rate will have a large predictable component associated with price adjustment. If the exogenous shocks are monetary rather than real, then this predictable component will be temporary. The short-term response of the real exchange rate will be reversed in the longer run and possibly eliminated as nominal price levels adjust to their equilibrium levels.

The sluggish-price version of the monetary model also has other implications for the real exchange rate. First, the anticipated percentage change in the real exchange rate equals the <u>ex ante</u> real interest-rate differential, as in the equilibrium models. As noted above, however, most of the changes in real exchange rates seem to be associated with changes in the long-run equilibrium rate rather than with short-term expected real-interest differentials.[21] This casts doubt on the empirical importance of the predictable component of real exchange rates associated with sluggish nominal price adjustments.[22]

Huizinga (1987) found that differences between the real exchange rate and its implied long-run equilibrium level are autocorrelated. He examined the dollar-pound exchange rate and found that the it undershoots rather than overshoots -- changes in the long-run equilibrium real exchange rate are accompanied on average by smaller changes (in the same direction) in the actual rate. Huizinga then imposed overshooting on the data. Even after doing this, he found substantial depreciation of the long-run real exchange rate of the dollar before 1980, substantial appreciation of the long-run real exchange rate from 1980 to 1985, and substantial depreciation after that. His estimates are inconsistent with the notion that most of the dollar's appreciation from 1980 to 1985 and its subsequent depreciation does not reflect changes in the long-run component. In fact, before imposing parameter values to force overshooting on the data, he found that the long-run exchange rate appreciated more from 1980 to 1985 than did the actual exchange rate.

Second, changes in the exchange rate should be useful predictors of future changes in nominal price levels, because the former adjusts rapidly to disturbances while the latter adjusts with a lag. Third, changes in the money supply should help explain changes in real exchange rates. Neither of these two implications is borne out strongly by the data (see, for example, Diba, 1987).

Third, differences between the real exchange rate and its implied long-run equilibrium level should be eliminated slowly as the nominal price level adjusts toward its new equilibrium after a disturbance. However, Huizinga points out that his estimates (when overshooting is imposed on the data) show that differences between the actual and long-run real exchange rates are eliminated suddenly rather than gradually. As he points out, this is "inconsistent with the view of real exchange-rate overshooting that comes from the 'sticky-price' models of exchange rate determination."

Fourth, the real exchange rate should vary more under a system of floating nominal exchange rates than under a system of fixed nominal exchange rates, because the short-term variations in the real exchange rate, due to changes in the nominal exchange rate, would vanish). This prediction is clearly borne out by the data. In Stockman (1988b) I have presented an equilibrium model of exchange rates that also has this feature. The troublesome aspect of the evidence that real exchange rates vary more under floating than under pegged exchange-rate systems (Stockman, 1983, and Mussa, 1986) is that both disequilibrium and equilibrium models predict that other macroeconomic and international-trade aggregates should be affected by the exchange-rate system. There is little or no evidence, however, to support this (see Baxter and Stockman, 1988).

If the disequilibrium exchange-rate model is appended to a standard macroeconomic model in which sluggish nominal-price adjustment leads to real-output effects of monetary policy, then it has further implications. Disturbances to the money supply or money demand should lead to temporary real and nominal depreciation associated with temporary increases in real output above trend. That is, the real and nominal value of the currency should show countercyclical responses from monetary disturbances. There is little statistical evidence of this, although it could reflect the preponderance of real disturbances. (The U.S. dollar, for example, appreciated rapidly in real terms during the recovery from the 1982 recession until 1985.)

The model also predicts that, in response to monetary shocks, the half-life of the temporary changes in real exchange rates and output relative to trend should be similar, because both are consequences of the same sluggish nominal-price behavior. The apparent permanent component in real exchange rates could be a highly persistent temporary component, but its half-life would be much too long relative to deviations of real output from trend. The statistical evidence that most of the variation in real exchange rates is explained by this permanent component is inconsistent with the view that nominal shocks, or even temporary real shocks, cause most of the important changes in exchange rates. It is consistent with the view that most changes in real exchange rates are due to real shocks with a large permanent component. Models with sluggish nominal price adjustment necessarily imply some intrinsic dynamics for real exchange rates as prices adjust toward equilibrium. It is possible that the transitory component in real exchange rates results from sluggish price adjustment following real disturbances.[23]

Some versions of the disequilibrium model also imply that currency depreciations should be accompanied by current account deficits, and appreciations by current account surpluses. This occurs partly because current account deficits are viewed as reducing domestic (and raising foreign) wealth, which reduces the demand for domestic money and leads to nominal and real depreciation. It also occurs partly because the reallocation of wealth reduces the demand for domestic goods and raises the demand for foreign goods. This raises the relative price of foreign goods which entails nominal and real depreciation. There is little evidence, however, that currency depreciations are accompanied by current account deficits, and vice-versa, as these models predict. Nor is there much evidence that money supply changes are associated with the current account.

Some versions of the disequilibrium model invoke the assumption of irrational expectations. Frankel and Froot (1986), for example, present a model that explains the behavior of the dollar in the 1980s in this way. Survey evidence of dealers in foreign exchange markets, and subsequent exchange rate behavior, supports their claim that expectations were biased. The Frankel-Froot model is subject to many of the same criticisms that I have made here of other disequilibrium models. The survey evidence is disconcerting, but it does not accord with evidence about expected exchange rates from the forward market. This raises the question of why these dealers, if they accurately reported their beliefs, did not take larger positions in the forward market and cause a change in the forward rate. The forward exchange rate is itself not an unbiased predictor of future spot exchange rates. The forward rate contains a risk premium. Given rational expectations, this risk premium must be large and variable. As with the "equity premium" on stocks relative to bonds, the risk premium on forward foreign exchange is larger than can be rationalized with commonly assumed degrees of risk-aversion and existing equilibrium models. However, the presence of a similar problem with equities suggests a common explanation. Econometric estimates of the variability of the risk premium are also subject to the problem that the statistical behavior of exchange rates is extremely complex. Some progress has been made recently with nonparametric methods (Gallant et al., 1988).

Fiscal deficits affect the real exchange rate through two new channels in the disequilibrium model. Typically, the models assume that the conditions for Ricardian equivalence are violated in the usual direction (that is, a cut in current taxes and offsetting rise in future taxes raises perceived current wealth). They also assume that households in each country have a greater income elasticity of demand for their own country's goods than for the other country's goods. Then an increase in the deficit due to a tax cut (with no change in the path of government spending) tends to induce currency appreciation as in the equilibrium model. The two new effects on the real exchange rate in the disequilibrium model work in opposite directions. First, a government budget deficit raises perceived wealth and therefore raises the demand for money, which leads to nominal and real (because of sluggish nominal prices) currency appreciation. Second, a government budget deficit raises the real interest rate, and therefore the nominal interest rate, and so reduces the demand for money. This causes nominal and real depreciation. These two forces affect the nominal exchange rate in the equilibrium model. In the disequilibrium models they also affect the real exchange rate. Devaluation, domestic credit expansion under pegged exchange rates, and official foreign-exchange-market operations under flexible rates, all have real effects in the disequilibrium model through these channels. Each affects real wealth by changing the stock of official reserves held by the government, which are not included in private wealth when Ricardian-equivalence does not hold.

The disequilibrium model of exchange rate changes implicitly underlies many media reports and policy discussions. It implies that the correlation between real and nominal exchange rate changes is exploitable by monetary policy. In contrast, the equilibrium models imply that exchange rate changes are not "causes" of changes in relative prices, but part of the process through which the changes occur in equilibrium. The disequilibrium model implies that currencies may become "overvalued" or "undervalued" relative to their equilibrium levels, that these are associated with changes in international "competitiveness" that are not justified by real comparative advantage, and that they cause welfare losses. The equilibrium model, in contrast, implies that it is incorrect to blame decreased "competitiveness" on the exchange rate or to expect an alternative exchange rate system, by itself, to affect competitiveness.[24] The equilibrium model implies that the question of whether a change in the exchange rate - or more general exchange rate volatility - is "good" or "bad" for the economy is not correctly posed because the exchange rate is an endogenous variable. The right question, according to that model, is whether the underlying disturbances to the economy are "good" or "bad," so (of course) the answer varies with the disturbance.

The implications of the disequilibrium model for monetary policy involve several trade-offs. Each tradeoff involves parameters that would be difficult to estimate in the current state of knowledge. The model suggests that it is feasible and desirable for monetary policy to take as one of its goals the exchange rate and the current account, on the grounds that monetary policy can affect real output and employment (as well as its distribution across sectors) through its influence on these variables. Monetary expansion, by causing real depreciation, raises "international competitiveness" and (consequently) output and employment in the export sector, though it may reduce output in sectors using imported inputs. It also implies that it is feasible and desirable for monetary policy to help prevent large fluctuations, unpredictability, or misalignments in the level of the exchange rate in order to prevent resource misallocations. However, monetary policy can create as well as alleviate resource misallocations in the disequilibrium model. This makes the policy problem difficult. Obstfeld (1985), for example, argues that "only when it is known that a particular goods-market shock will be reversed within several years is there a case for resisting its real exchange rate effect through monetary policy so that excessive relocation costs are avoided," through various government policies. Even then, he notes that attempts to prevent misalignments through monetary policy alone may "encounter serious pitfalls." The disequilibrium model also implies that the exchange rate and the current account carry information about the sources of other exogenous disturbances to the economy that might impinge on monetary policy. Acquiring this information, however, is not easy.

The model does not have unambiguous implications about the optimal exchange-rate system, except in special cases. Arguments can be made with this model for pegged exchange rates or target zones. The slope of the short-run Phillips curve may be steeper under floating exchange rates than under fixed (Obstfeld, 1985), so if monetary policy is used to try to stabilize output, a case can be made for pegged exchange rates. Pegged rates would also entail less real exchange-rate variability or misalignment as a consequence of monetary disturbances, and would eliminate undesirable current account behavior due to "inappropriate" exchange rates.[25] On the other hand, pegged exchange rates would entail periodic finite adjustment unless other policies were changed. These adjustments might create uncertainty about the credibility of the pegged rates, leading to speculative attacks, interest-rate variability, and the possible imposition of controls, restrictions, and taxes on international trade and payments. Arguments based on the variability of exchange rates or their "misalignments" are not necessarily arguments for pegged exchange rates, but for appropriate monetary (and other) policies, which can be followed under a system of flexible rates. Finally, if the economy is subject to real disturbances that require changes in the equilibrium real exchange rate then a system of floating exchange rates could be better than a system of pegged rates because (with sluggish nominal price adjustment) it permits relative prices such as the real exchange rate to adjust more quickly to the equilibrium level. That is, flexibility of exchange rates can substitute for flexibility of nominal goods prices.

Whether these policy arguments should be taken seriously depends largely on whether the model on which they are based is to be taken seriously for purposes of evaluating alternative policies. Also relevant is the robustness of the policy arguments to alternative assumptions and models. Here arises an objection to this class of models. They are not "structural" in Lucas's (1976) sense, and so they cannot be relied on for evaluations of alternative policies.[26] One part of the problem is the treatment of market failures. Rather than modelling market failures such as price sluggishness from microeconomic foundations, they postulate it at a macroeconomic level. There are by now many examples showing that this methodology leads to incorrect inferences. The models do not explain adequately the reasons for nominal price sluggishness, or why that sluggishness -- if it exists -- affects real resource allocation.[27,28,29]

In the face of this evidence, it is difficult to take this class of models seriously as a basis for policy formulation. Nevertheless, policymakers should perhaps not dismiss the implications of these models entirely until the alternatives are better developed and checked empirically. But policies should be based on this class of models only if they are robust to those alternative models that are more consistent with the data.[30]

4. Policy Formation in the Absence of Strong Evidence: Conclusions

Monetary policy must be formulated in a situation of uncertainty about which of the models discussed above gives a better approximation of the world for this purpose. I have argued that the equilibrium model is the best model for this purpose, but, as Mencken said, foreign exchange is resistant to formulae. Formally, one could set up a decision problem for monetary policymakers, assign probabilities to each of the competing theories (as well as their intersections), and derive the policy that would maximize expected utility. I do not attempt that formal exercise here. Instead, I will argue that if one places some positive probability on both the sluggish-nominal-price model and the equilibrium model, but takes into account the existing evidence, then a reasonable monetary policy will place little weight on exchange rates and the current account, and most weight on domestic inflation or output stabilization and growth.

If the equilibrium model were true, then there would be nothing to be gained from a monetary policy geared to exchange rates or the current account, and the losses would all occur in the resulting behavior of inflation. If the sluggish-nominal-price model were true, then there could be gains from monetary policies directed at changing the exchange rate and the current account. If we could be sure that one model or the other was a good description of the world, then the relevant tradeoffs would involve inflation against the potential gains from monetary policy through reductions in resource misallocations due to real exchange rate "misalignments" and variability, or from "inappropriate" levels of the current account.

But it is unlikely that all of the important effects of monetary policy are adequately and accurately captured by either of these models alone, or even in combination. If monetary policy can affect the real exchange rate, but most changes in real exchange rates are due to real disturbances altering the long-run equilibrium level, then monetary policy aimed at offsetting any particular change in the real exchange rate, or attempting to change its level, is at least as likely to be harmful as beneficial. If policymakers had detailed and accurate knowledge of the market failures in the economy as well as all of the parameters and relevant disturbances in a timely fashion, then they could calculate the value of the real exchange rate that would maximize some social welfare function. If the market failures had certain characteristics (such as involving nominal variables in some fundamental way) then perhaps the policymakers could use monetary policy to move toward the level of the real exchange rate that maximizes welfare. But without all this information in the minds of policymakers, attempts to improve welfare by conducting monetary policy to manipulate the real exchange rate or current account are likely to reduce welfare.

This does not suggest that all attempts at "activist" monetary policy would be likely to reduce welfare. Countercyclical rules such as those proposed by McCallum (1988) may increase welfare on average, even though a similar argument apples to these rules. If monetary policy affects real output, then (for example) monetary expansion following a decline in the growth rate of total output is likely to reduce rather than raise welfare if that decline in output growth was an optimal market response to external disturbances (as, say, in real business cycle models). The difference between the two cases is that it may be much easier to isolate changes in aggregate output that are inefficient responses to external circumstances than to isolate inefficient responses of the current account and exchange rates <u>and</u> to identify accurately the effects of these inefficient responses on output. If output is a major concern for monetary policy, it is more efficient to concentrate policy directly on it than through the slippery, roundabout channels related to exchange rates and the current account.[31]

Table 1

Fraction of Variance of Real Exchange Rate Changes, 1979:10 - 1986:3, Explained by

		(i) Changes in ex-ante real-interest differential	(ii) Changes in long-run equilibrium exchange rate	(iii) Their covariance	C*
US - Canada	(1)	9%	85%	6%	.95
US - Canada	(2)	16%	75%	9%	.92
US - UK	(1)	8%	79%	13%	.96
US - UK	(2)	21%	198%	-119%	.98
US - Germany	(1)	4%	98%	-2%	.98
US - Germany	(2)	27%	126%	-52%	.89
US - Japan	(1)	4%	81%	15%	.98
US - Japan	(2)	2%	91%	7%	.99
US trade-	(1)	6%	84%	10%	.97
weighted	(2)	42%	188%	-130%	.90

(1) and (2) refer to different models of the risk-premium on foreign exchange; see Campbell and Clarida (1987).

C* is the estimated correlation between innovations in the actual real exchange rate and the long-run equilibrium real exchange rate.

Source: Campbell and Clarida (1987)

1. The solution to these models can also involve nonstationary solutions, typically referred to as "bubbles," or, sometimes, "rational bubbles." These are self-fulfilling rational expectations equilibria, and there are infinitely many of them. They can be nonstochastic, exponential terms in the exchange rate, or they can be stochastic, even bursting with probability one (and, of course, agents with rational expectations know this). However, all of the bubble equilibria studied in these models involve bubbles in <u>all nominal</u> variables, not just the exchange rate: nominal price levels would show the same paths. We do not observe nominal goods prices that behave in ways that suggest the existence of such bubbles. In addition, we observe changes in <u>real</u> exchange rates (see the text, below) that are highly correlated with changes in nominal exchange rates, which is not a feature of these bubbles. No one has yet worked out a formal theory of these bubbles with sluggish nominal prices. Finally, even if these bubble solutions were to characterize exchange rate behavior, there may be nothing that monetary policy can do to prevent them. Finally, if markets are complete, as King, Wallace, and Weber, and Manuelli and Peck (in separate research) have shown, these bubbles have no consequences for resource allocation. Essentially, complete markets allow people to completely diversify away the risk associated with bubbles (and there is no aggregate risk, associated with bubbles, to be shared in their models). Pegging the nominal exchange rate could prevent bubbles in the nominal exchange rate, but the same bubbles in the price level could still occur (except that they would now be the same in each country). If markets are complete, the bubbles have no welfare consequences, so they do not suggest a role for government policy. If markets are incomplete, people may not be able to diversify away the risks associated with these bubbles. As a result, the bubbles may affect welfare, as may the exchange-rate system. But the nature of these effects is extremely complicated. In principle there may be government policies that could improve welfare in this case. In practice, for policy purposes, this model does not seem particularly helpful.

2. I use the term "real exchange rate" here to mean the exchange-rate-adjusted ratio of nominal price levels in the two countries. If p and p* are price indexes in the home and foreign countries and e is the appropriately defined exchange rate, the real exchange rate is ep*/p.

3. That is, using the notation from footnote 2, e (or its rate of change) varies much more than p*/p. A separate, but related, general observation is that the variances of e and ep*/p, or of their rates of change, are nearly the same.

4. See also the discussion in Frankel and Meese (1987).

5. In this sense, the equilibrium models of exchange rates are related to "real business cycle" models that emphasize changes in tastes or technologies on equilibrium quantities and prices in closed economies.

6. See also Stockman (1980, 1983, 1988b), Helpman and Razin (1982, 1983), Obstfeld and Stockman (1985), Hodrick (1986, 1988), Svensson (1985), Stockman and Svensson (1987), Edwards (1988), Salyer (1988), and Stockman and Dellas (1988). The approach is loosely based on Friedman (1951).

7. The experiment here involves a change in the time path of the collection of a fixed present value of tax receipts.

8. Another argument is frequently made. Assume that assets denominated in domestic and foreign currencies are imperfect substitutes in portfolios. A tax cut in the U.S., resulting in a budget deficit, would raise the real interest rate on dollar-denominated assets. Then, it is argued, the return on dollar-denominated assets exceeds the yield on assets denominated in foreign currency. To keep investors from selling dollar assets to buy foreign-currency assets, the dollar must be expected to depreciate. So the budget deficit must cause dollar appreciation in order to induce the required expected dollar depreciation.

The problem with this argument is that investors would not want to sell dollar assets to buy foreign-currency assets. The increase in the real interest rate on dollar assets is an equilibrium phenomenon: the reason the interest rate rises is that the supply of dollar assets is raised by the budget deficit, and investors must be induced to hold the greater supply. To induce them, the return on dollar assets rises above the return on foreign-currency assets. This is an equilibrium precisely because the assets are imperfect substitutes.

9. Some of these are discussed in Obstfeld and Stockman (1985).

10. Campbell and Clarida estimated a state-space model that treats the expected change in the real exchange rate, the expected real-interest differential, and the long-run equilibrium real exchange rate as unobserved variables. The econometrician observes only the ex-post change in the real exchange rate and the ex-post real interest differential. These ex-post observable variables are related to the unobserved expected variables by a forecast error that is white noise due to rational expectations. In addition, they assumed that the (unobserved) long-run equilibrium real exchange rate is a random walk. Model (1) in the table refers to results based on the assumption of no risk premium in the foreign exchange market; model (2) refers to results based on the

assumption that the risk premium is linearly related to the (unobserved) ex-ante real-interest differential.

11. This is done by taking the maximum of column (i) and the sum of columns (i) and (iii).

12. As Huizinga explains, his procedure does not justify the interpretation that the remaining 42% of the variance of real exchange rate changes is accounted for by transitory components.

13. Huizinga's study involves only 12 years of monthly data. The estimates obtained are not significantly different from those that would result if the real exchange rate were a random walk, nor from those that would result from white noise.

14. Kaminsky also notes that this is why the simple monetary models have performed so poorly empirically.

15. See footnote 1. Also see the excellent summary and critique in Frankel and Meese of econometric tests for bubbles in foreign exchange markets.

16. Grilli reported two sets of estimates that support this result: simple regression results and estimates from a maximum likelihood technique to correct for the fact that the probability distribution of changes in the exchange rate differs between pegged and flexible exchange rate systems. Grilli interprets the variable I have called real taxes as the permanent component of government spending; he measures it as actual real government spending minus the real deficit. Grilli's label for this variable is based on his theoretical model which implies that the permanent component of real government spending equals the tax rate, because the tax rate is adjusted to guarantee this. I prefer the more straightforward label of his variable as the level of real taxes relative to GNP. Grilli also includes separate measures of government receipts relative to GNP, but these do not correspond to the real tax rate, that is, the difference between real government spending and the real deficit.

17. That is, this explanation attributes the rise in the dollar to the deficit rather than the level of government spending. This explanation implies that the dollar would depreciate in real terms if the deficit were eliminated by a tax increase, holding current and prospective future spending fixed.

18. See Evans (1986), Feldstein (1986), Stockman (1986), and Hodrick (1988).

19. See Stockman (1986), Ayanian (1987), Grilli and Beltratti (1987), and Grilli (1987).

20. Direct estimation of a relationship between budget deficits and real exchange rate changes also suggests that there is no systematic relation between them. The coincidence of currency appreciation and government budget deficits, as in the U.S. from 1980 to 1985, is more an exception than the rule. As noted in Stockman (1986) and Evans (1986), government spending may play a more important role than budget deficits per se.

21. Huizinga (1987) estimates that 33%-40% of a change in the real value of the dollar or the British pound over any four-year interval is likely to be reversed over the following four-year interval, and that the remaining change in the real exchange rate is permanent.

22. The observed predictable, transitory component could be associated with transitory disturbances rather than slow nominal price adjustment.

23. It is also possible that disturbances have transitory as well as permanent components, in which case the equilibrium model could explain the temporary component of real exchange rates. Alternatively, the equilibrium model might imply intrinsic dynamics due, say, to adjustment costs or differences between short-run and long-run demand elasticities.

24. Studies suggesting that changes in the real or nominal exchange rate cause changes in output, employment, and so on, confuse endogenous and exogenous variables. It is sometimes argued that it is appropriate to treat exchange rate changes as exogenous when studying a particular industry. The argument is that changes in one industry will not have aggregate effects and so will not affect the exchange rate. This argument is the basis for a number of studies purporting to measure the effects of changes in exchange rates on employment, output, and so on, by industry and region. However, the argument is incorrect. For a representative industry, according to the equilibrium model, disturbances to supply or demand are correlated with changes in the exchange rate, so that the exchange rate is not independent of disturbances in employment or output regressions, and cannot legitimately be treated as an exogenous variable. If there are a large number of industries each with (say) supply disturbances due to technology shocks, then one of two situations occurs. Either all of the disturbances are

independent, in which case there is <u>no aggregate disturbance</u> and so no change in the exchange rate as a consequence of these technology shocks (and in which case the exchange rate would be perfectly collinear with the constant term), or the disturbances are <u>not</u> independent, so that there is an aggregate disturbance and an exchange rate change as a consequence. But, with dependent disturbances, the typical industry disturbance is correlated with the aggregate, and the exchange rate is not an exogenous variable.

25. Current account "imbalances" are sometimes thought to be bad because (i) they entail inappropriate shifts in production, e.g. between traded and nontraded goods, and (ii) current account deficits reduce domestic wealth and imply less future consumption.

26. For example, it is argued in Stockman (1980) that the correlation between the real and nominal exchange rate is, like the correlation between inflation and output relative to trend, not exploitable by monetary policy.

27.See Barro and Romer (1987) for an example of nominal price sluggishness that does not cause misallocations.

28. It is interesting to note that the models typically assume that nominal home-currency export prices are sticky, but not import prices (which involve the product of a variable exchange rate and a sticky foreign-currency nominal export price). It seems difficult to rationalize this kind of stickiness on the basis of menu costs at the retail level.

29. There have been attempts to test formally disequilibrium models of exchange rates against flexible-price alternatives. Generally, these attempts involve formulating a model and either (i) estimating a parameter that determines the speed of price adjustment, or (ii) performing a general specification test on the flexible-price model. See, e.g. Kaminsky (1987), who rejects the specification test and interprets this rejection as a rejection of the flexible-price assumption. The alternative interpretation, of course, is that the flexible-price model is not correctly specified in some other way. Given the numerous problems with the estimates generally obtained, this is my preferred interpretation, though others may (and do) disagree.

30. One need not reject sluggish nominal price adjustment entirely to believe that it does not play an important role in explaining <u>exchange rates</u>. Aggregate business fluctuations are highly correlated across countries, so nominal price sluggishness could play an important role in business cycles without necessarily having a major effect on exchange rates.

31. If there were important information in the behavior of the current account or exchange rates regarding disturbances, this conclusion would be different. All of the theories imply that there _is_ such information. However, all of the evidence indicates that we do not yet know how to recover it.

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