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Currency Crises

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1. *Paul Krugman*

On 2 July of this year, after months of asserting that it would do no such thing, the government of Thailand abandoned its efforts to maintain a fixed exchange rate for the baht. The currency quickly depreciated by more than 20 percent; within a few days most neighboring countries had been forced to emulate the Thai example.

What forced Thailand to devalue its currency was massive speculation against the baht, speculation that over a few months had consumed most of what initially seemed an awesomely large war chest of foreign exchange. And why were speculators betting against Thailand? Because they expected the baht to be devalued, of course.

This sort of circular logic—in which investors flee a currency because they expect it to be devalued, and much (though usually not all) of the pressure on the currency comes precisely because of this investor lack of confidence—is the defining feature of a currency crisis. We need not seek a more formal or careful definition; almost always we know a currency crisis when we see one. And we have been seeing a lot of them lately. The 1990s have, in fact, offered the spectacle of three distinct regional waves of currency crises: Europe in 1992–93, Latin America in 1994–95, and the Asian crises still unfolding at the time of writing.

Currency crises have been the subject of an extensive economic literature, both theoretical and empirical. Yet there remain some important unresolved issues, and each new set of crises presents new puzzles. The purpose of this paper is to provide an overview both of what we know and of what we do not know about currency crises, illustrated by reference to recent experience.

The paper begins by describing the “canonical” crisis model, a simple yet

suggestive analysis that was developed twenty years ago but remains the starting point for most discussion. Despite that canonical model's virtues, however, it has come in for justified criticism because of its failure to offer a realistic picture either of the objectives of central banks or of the constraints they face; thus the paper turns next to a description of "second-generation" crisis models that try to remedy these defects.

As it turns out, second-generation models have suggested a reconsideration of a basic question that the canonical model seemed to have answered: are currency crises always justified? That is, do currencies always get attacked because the markets perceive (rightly or wrongly) some underlying inconsistency in the nation's policies, or can they happen arbitrarily to countries whose currencies would otherwise have remained sound? The paper describes several different scenarios for currency crises that are not driven by fundamentals, including self-fulfilling crises in which endogenous policy ends up justifying investor pessimism, "herding" by investors, and the machinations of large agents ("Soroi"). Closely related to the question of arbitrary crises is "contagion," the phenomenon in which a currency crisis in one country often seems to trigger crises in other countries with which it seemingly has only weak economic links (e.g., Mexico and Argentina, or Thailand and the Philippines).

From there the paper moves to cases, considering in turn the three regional crisis waves of the 1990s (so far). Comparison of these waves turns out to raise a further puzzle: while the onset of crisis was similar in each case, the *consequences* of the crises seem to have been very different in the European as opposed to the Latin and Asian cases.

Finally, of course, we must ask the big question: is there any way to make crises less frequent, and if so what?

8.1.1 The Canonical Crisis Model

The canonical crisis model derives from work done in the mid-1970s by Stephen Salant, at that time at the Federal Reserve's International Finance Section. Salant's concern was not with currency crises but with the pitfalls of schemes to stabilize commodity prices. Such price stabilization, via the establishment of international agencies that would buy and sell commodities, was a major demand of proponents of the so-called New International Economic Order (NIEO). Salant, however, argued on theoretical grounds that such schemes would be subject to devastating speculative attacks.

His starting point was the proposition that speculators will hold an exhaustible resource if and only if they expect its price to rise rapidly enough to offer them a rate of return equivalent (after adjusting for risk) to that on other assets. This proposition is the basis of the famous Hotelling model of exhaustible resource pricing: the price of such a resource should rise over time at the rate of interest, with the level of the price path determined by the requirement that the resource just be exhausted by the time the price has risen to the "choke point" at which there is no more demand.

But what will happen, asked Salant, if an official price stabilization board announces its willingness to buy or sell the resource at some fixed price? As long as the price is above the level that would prevail in the absence of the board—that is, above the Hotelling path—speculators will sell off their holdings, reasoning that they can no longer expect to realize capital gains. Thus the board will initially find itself acquiring a large stockpile. Eventually, however, the price that would have prevailed without the stabilization scheme—the “shadow price”—will rise above the board’s target. At that point speculators will regard the commodity as a desirable asset and will begin buying it up; if the board continues to try to stabilize the price, it will quickly—instantaneously, in the model—find its stocks exhausted. Salant pointed out that a huge wave of speculative buying had in effect forced the closure of the open market in gold in 1969 and suggested that a similar fate would await NIEO price stabilization schemes.

This basic logic was described briefly in a classic 1978 paper by Salant and his colleague Dale Henderson (their main concern in that paper was with the more recent behavior of the gold price, and in particular with the effects of unpredictable sales of official gold stocks). Other researchers soon realized, however, that similar logic could be applied to speculative attacks not on commodity boards trying to stabilize commodity prices but on central banks trying to stabilize exchange rates.

The canonical currency crisis model, as laid out initially by Krugman (1979) and refined by Flood and Garber (1984), was designed to mimic the commodity board story. The upward trend in the “shadow” price of foreign exchange—the price that would prevail after the speculative attack—was supplied by assuming that the government of the target economy was engaged in steady, uncontrollable issue of money to finance a budget deficit. Despite this trend, the central bank was assumed to try to hold the exchange rate fixed using a stock of foreign exchange reserves, which it stood ready to buy or sell at the target rate.

Given this stylized representation of the situation, the logic of currency crisis was the same as that of speculative attack on a commodity stock. Suppose speculators were to wait until the reserves were exhausted in the natural course of events. At that point they would know that the price of foreign exchange, fixed up to now, would begin rising; this would make holding foreign exchange more attractive than holding domestic currency, leading to a jump in the exchange rate. But foresighted speculators, realizing that such a jump was in prospect, would sell domestic currency just before the exhaustion of reserves—and in so doing advance the date of that exhaustion, leading speculators to sell even earlier, and so on. . . . The result would be that when reserves fell to some critical level—perhaps a level that might seem large enough to finance years of payments deficits—there would be an abrupt speculative attack that would quickly drive those reserves to zero and force an abandonment of the fixed exchange rate.

The canonical currency crisis model, then, explains such crises as the result of a fundamental inconsistency between domestic policies—typically the per-

sistence of money-financed budget deficits—and the attempt to maintain a fixed exchange rate. This inconsistency can be temporarily papered over if the central bank has sufficiently large reserves, but when these reserves become inadequate speculators force the issue with a wave of selling.

This model has some important virtues. First of all, many currency crises clearly *do* reflect a basic inconsistency between domestic and exchange rate policy; the specific, highly simplified form of that discrepancy in the canonical model may be viewed as a metaphor for the more complex but often equally stark policy incoherence of many exchange regimes. Second, the model demonstrates clearly that the abrupt, billions-lost-in-days character of runs on a currency need not reflect either investor irrationality or the schemes of market manipulators. It can be simply the result of the logic of the situation, in which holding a currency will become unattractive once its price is no longer stabilized, and the end of the price stabilization is itself triggered by the speculative flight of capital.

These insights are important, especially as a corrective to the tendency of observers unfamiliar with the logic of currency crises to view them as somehow outside the normal universe of economic events—whether as a revelation that markets have been taken over by chaos theory, that “virtual money” has now overpowered the real economy (Drucker 1997), or as *prima facie* evidence of malevolent market manipulation.

Despite the virtues of the canonical model, however, a number of economists have argued that it is an inadequate representation of the forces at work in most real crises. These economists have developed what are sometimes known as “second-generation” crisis models, to which we now turn.

8.1.2 More Sophisticated Models

Perhaps the best way to describe what is wrong with the canonical crisis model is to say that it represents government policy (though not the market response) in a very mechanical way. The government is assumed to blindly keep on printing money to cover a budget deficit, regardless of the external situation; the central bank is assumed to doggedly sell foreign exchange to peg the exchange rate until the last dollar of reserves is gone. In reality the range of possible policies is much wider. Governments can and do try to condition fiscal policies on the balance of payments. Meanwhile, central banks have a variety of tools other than exchange market intervention available to defend the exchange rate, including in particular the ability to tighten domestic monetary policies. Obviously there are costs to such policies; but it may be important to recognize that the defense of an exchange rate is a matter of trade-offs rather than a simple matter of selling foreign exchange until the money is gone.

So-called second-generation models, perhaps best represented by Obstfeld (1994), require three ingredients. First, there must be a reason why the government would like to abandon its fixed exchange rate. Second, there must be a

reason why the government would like to *defend* the exchange rate—so that there is a tension between these motives. Finally, in order to create the circular logic that drives a crisis, the cost of defending a fixed rate must itself increase when people expect (or at least suspect) that the rate might be abandoned.

Why might a government have a motive to allow its currency to depreciate? The general slogan here is “It takes two nominals to make a real.” In order for a government to have a real incentive to change the exchange rate, *something* must be awkwardly fixed in domestic currency. One obvious possibility is a large debt burden denominated in domestic currency—a burden that a government might be tempted to inflate away but cannot as long as it is committed to a fixed exchange rate. (E.g., the attacks on the French franc during the 1920s were triggered mainly by suspicions that the government might try to inflate away its legacy of debt from World War I.) Another possibility is that the country suffers from unemployment due to downwardly rigid nominal wage rates and would like to adopt a more expansionary monetary policy but cannot as long as it is committed to a fixed exchange rate. (This was in essence the motivation both for Britain’s abandonment of the gold standard in 1931 and its departure from the Exchange Rate Mechanism—ERM—of the European Monetary System in 1992.)

Given a motive to depreciate, why would a government choose instead to defend a fixed rate? One answer might be that it believes that a fixed rate is important in facilitating international trade and investment. Another might be that it has a history of inflation and regards a fixed rate as a guarantor of credibility. Finally, the exchange rate often takes on an important role as a symbol of national pride or commitment to international cooperation (as in the European Monetary System).

Finally, why would public lack of confidence in the maintenance of a fixed rate itself have the effect of making that rate more difficult to defend? Here there is a somewhat subtle distinction between two variants of the story. Some modelers—notably Obstfeld (1994)—emphasize that a fixed rate will be costly to defend if people expected *in the past* that it would be depreciated *now*. For example, debt holders might have demanded a high rate of interest in anticipation of a depreciation, therefore making the current debt burden so large that it is hard to manage without a depreciation. Or unions, expecting depreciation, might have set wages at levels that leave the country’s industry uncompetitive at the current exchange rate.

The alternative (which to my mind seems much closer to what happens in real crises) is to suppose that a fixed rate is costly to defend if people *now* expect that it will be depreciated *in the future*. The usual channel involves short-term interest rates: to defend the currency in the face of expectations of future depreciation requires high short-term rates; but such high rates may either worsen the cash flow of the government (or indebted enterprises) or depress output and employment.

Suppose we take these three generic elements together: a reason to depreci-

ate, another reason *not* to depreciate, and some reason why expectations of a depreciation themselves alter the balance between the costs and benefits of maintaining a fixed parity. As pointed out in Krugman (1996), it is possible to combine these elements to produce a general story about currency crises that is quite similar to that in the canonical model. Suppose that a country's fundamental trade-off between the costs of maintaining the current parity and the costs of abandoning it is predictably deteriorating, so that at some future date the country would be likely to devalue even in the absence of a speculative attack. Then speculators would surely try to get out of the currency ahead of that devaluation—but in so doing they would worsen the government's trade-off, leading to an earlier devaluation. Smart investors, realizing this, would try to get out still earlier . . . the end result will therefore be a crisis that ends the fixed exchange rate regime well before the fundamentals would appear to make devaluation necessary.

We can actually be more specific: given an inevitable eventual abandonment of a currency peg and perfectly informed investors, a speculative attack on a currency will occur *at the earliest date at which such an attack could succeed*. The reason is essentially arbitrage: an attack at any later date would offer speculators a sure profit; this profit will be competed away by attempts to anticipate the crisis.

It is important to notice an important point about this scenario. In the case just described—as in the canonical model—the crisis is ultimately provoked by the inconsistency of government policies, which make the long-run survival of the fixed rate impossible. In that sense the crisis is driven by economic fundamentals. Yet that is not the way it might seem when the crisis actually strikes: the government of the target country would feel that it was fully prepared to maintain the exchange rate for a long time and would in fact have done so, yet was forced to abandon it by a speculative attack that made defending the rate simply too expensive.

I think that it is fair to say that the standard reaction both of most economists and of international officials to currency crises is, at least informally, based on something like the scenario just described. That is, they recognize that the speculative attack, driven by expectations of devaluation, was itself the main proximate reason for devaluation; yet they regard the whole process as ultimately caused by the policies of the attacked country, and in particular by a conflict between domestic objectives and the currency peg that made an eventual collapse of that peg inevitable. In effect, the financial markets simply bring home the news, albeit sooner than the country might have wanted to hear it.

A significant number of economists studying this issue do, however, believe that the complaints of countries that they are being unfairly or arbitrarily attacked have at least some potential merit. So let me turn to the possible ways that—especially in the context of second-generation models—such complaints might in fact be justified.

8.1.3 Disputed Issues

I have just argued that although the detailed workings of a second-generation currency crisis model may be very different from those of the original models, the general result can be much the same: a currency crisis is essentially the result of policies inconsistent with the long-run maintenance of a fixed exchange rate. Financial markets simply force the issue and indeed must do so as long as investors are forward looking.

However, it is possible to conceive of a number of circumstances under which the financial markets are not as blameless as all that. The list below may not include all the relevant scenarios, but it seems to cover the cases most often mentioned.

Self-Fulfilling Crises

Suppose that, contrary to our earlier assumption, an eventual end to a currency peg is not completely preordained. There may be no worsening trend in the fundamentals; or there may be an adverse trend, but at least some realistic possibility that policies may change in a way that reverses that trend. Nonetheless, it may be the case that the government will abandon the peg if faced with a sufficiently severe speculative attack.

The result in such cases will be the possibility of self-fulfilling exchange rate crises. An individual investor will not pull his money out of the country if he believes that the currency regime is in no imminent danger; but he will do so if a currency collapse seems likely. A crisis, however, will materialize precisely if many individual investors do pull their money out. The result is that either optimism or pessimism will be self-confirming; and in the case of self-confirming pessimism, a country will be justified in claiming that it suffered an unnecessary crisis.

How seriously should we take this analysis? One obvious caveat understood by the economists studying this issue, but perhaps too easily forgotten by political figures, is that this analysis does not imply either that any currency can be subject to speculative attack or that all speculative attacks are unjustified by fundamentals. Even in models with self-fulfilling features, it is only when fundamentals—such as foreign exchange reserves, the government fiscal position, the political commitment of the government to the exchange regime—are sufficiently weak that the country is potentially vulnerable to speculative attack. A country whose government is expected to defend its currency firmly and effectively will probably not need to do so, while a country whose government is very likely to abandon its peg eventually in any case will almost surely find its timetable accelerated by speculative pressure. Or to put it a bit differently: one can think of a range of fundamentals in which a crisis *cannot* happen, and a range of fundamentals in which it *must* happen; at most, self-fulfilling crisis models say that there is an intermediate range in which a crisis *can* happen but

need not. It is an empirical question (though not an easy one) how wide this range is.

It is also important to remember that a country whose fundamentals are persistently and predictably deteriorating will necessarily have a crisis at some point. Since the logic of predictable crises is that they happen well before the fundamentals have reached the point at which the exchange rate would have collapsed in the absence of speculative attack—indeed, as argued above, they happen as soon as an attack can “succeed”—it will always seem at the time that the crisis has been provoked by a speculative attack not justified by current fundamentals.

Let me add a conjecture here, which has not to my knowledge been addressed in the theoretical literature to date. A situation in which a crisis could happen but need not presents speculators with a “one-way option”: they will reap a capital gain (or, if you measure it in foreign currency, avoid a capital loss) by selling domestic currency if the exchange regime collapses but will not suffer an equivalent loss if it does not. What, then, prevents them from fleeing the currency at even a hint of trouble? My conjecture is that microeconomic frictions—transaction costs, the difficulty of arranging credit lines, and so on—play an important role. Ordinarily we think of these frictions as being of trivial importance for macroeconomic issues, on the grounds that they are only a small fraction of a percentage point of the value transacted. However, currency crises unfold over very short periods, in which even small transaction costs can offset very large annualized rates of return. It may be small frictions that prevent a subjectively low-probability crisis from ballooning into a full-fledged speculative attack. If this is true, then the improving technical efficiency of markets may actually be a contributory factor to the frequency of currency crises in the 1990s.

If self-fulfilling crises are a real possibility, what sets them off? The answer is that anything could in principle be the trigger. That is, we are now in the familiar terrain of “sunspot” dynamics, in which any arbitrary piece of information becomes relevant if market participants believe it is relevant.

Herding

Both the canonical currency crisis model and the second-generation models presume that foreign exchange markets are efficient—that is, that they make the best use of the available information. There is, however, very little evidence that such markets are in fact efficient; on the contrary, the foreign exchange market (like financial markets in general) exhibits strong “anomalies” that can be reconciled with efficiency, if at all, only with layers of otherwise unpersuasive assumptions that irresistibly suggest the epicycles of pre-Copernican astronomy.

What difference might inefficient markets make to the study of currency crises? The most obvious difference is the possibility of “herding.” In general, herding can be exemplified by the result found in Shiller’s (1989) remarkable

survey of investors during the 1987 stock market crash: the only reason consistently given by those selling stocks for their actions was the fact that prices were going down. In the context of a currency crisis, of course, such behavior could mean that a wave of selling, whatever its initial cause, could be magnified through sheer imitation and turn, quite literally, into a stampede out of the currency.

Aside from the (very real) biases and limitations of human cognition, why might herding occur? Theorists have proposed two answers consistent with individual rationality. One involves bandwagon effects driven by the awareness that investors have private information. Suppose that investor 1 has special information about the Thai real estate market, investor 2 has special information about the financial condition of the banks, and investor 3 has information about the internal discussions of the government. If investor 1 gets some negative information, he may sell, since that is all he has to go on; if investor 2 learns that investor 1 has sold, he may sell also even if his own private information is neutral or even slightly positive. And investor 3 may then end up selling even if his own information is favorable, because the fact that both investors 1 and 2 have sold leads him to conclude that both may well have received bad news, even though in fact they have not. Chari and Kehoe (1996) have argued that such bandwagon effects in markets with private information create a sort of “hot” money that at least sometimes causes foreign exchange markets to overreact to news about national economic prospects.

Another explanation focuses on the fact that much of the money that has been invested in crisis-prone countries is managed by agents rather than directly by principals. Imagine a pension fund manager investing in emerging market funds. She surely has far more to lose from staying in a currently unpopular market and turning out to be wrong than she does to gain from sticking with the market and turning out to be right. To the extent that money managers are compensated based on comparison with other money managers, then, they may have strong incentives to act alike even if they have information suggesting that the market’s judgment is in fact wrong. (As an aside, herding by individual investors may well result from a similar kind of internal principal agent problem; as Schelling 1984 has argued, many aspects of individual behavior make sense only if viewed as the result of a sort of internal struggle between agents with longer term and shorter term perspectives. Put it this way: I will probably *feel* worse if I lose money in a Thai devaluation when others do not than I will if I lose the same amount of money in a general rout.)

A final point: anyone who has followed the currency crises of the 1990s must at least have speculated on what we might call reverse herding. In general, as described at greater length below, the markets seem to have been oddly complacent until shortly before the crises, even though there were ample reasons to think that there was at least some risk of such crises. Principal-agent-type stories might be one explanation of this passivity: money managers (or internal, subjective money management “modules”) were less concerned about

crisis than they should have been because they were acting the same way as everyone else.

Contagion

The currency crises of the 1990s have consisted of three regional “waves”: the ERM crises in Europe in 1992–93, the Latin American crises of 1994–95, and the Asian crises currently in progress. But why should there be such regional waves—as Ronald Reagan said after visiting Latin America, they are all different countries, so why should they experience a common crisis? This is the issue of “contagion.”

One simple explanation of contagion involves real linkages between the countries: a currency crisis in country A worsens the fundamentals of country B. For example, the Southeast Asian countries currently under speculative attack are, to at least some extent, selling similar products in world export markets; thus a Thai devaluation tends to depress Malaysian exports and could push Malaysia past the critical point that triggers a crisis. In the European crises of 1992–93, there was an element of competitive devaluation: depreciation of the pound adversely affected the trade and employment of France, or at least was perceived to do so, and thus increased the pressures on the French government to abandon its own commitment to a fixed exchange rate.

However, even in the European and Asian cases the trade links appear fairly weak; and in the Latin American crisis of 1995 they were virtually nil. Mexico is neither an important market nor an important competitor for Argentina; why, then, should one peso crisis have triggered another?

At this point two interesting “rational” explanations for crisis contagion between seemingly unlinked economies have been advanced (Drazen 1997). One is that countries are perceived as a group with some common but imperfectly observed characteristics. To caricature this position, Latin American countries share a common culture and therefore, perhaps, a “Latin temperament”; but the implications of that temperament for economic policy may be unclear. Once investors have seen one country with that cultural background abandon its peg under pressure, they may revise downward their estimate of the willingness of other such countries to defend their parties. (An observation: In 1982 the Latin countries suffered a crisis that, although it mainly involved dollar-denominated debt rather than domestic currency, was similar in form and psychology to a currency crisis. This crisis quickly spread from Mexico through the whole area. The Philippines, however, were at first unaffected, even though both its policies and its debt burden were quite as bad as those of Mexico, Argentina, and Brazil; it was not until almost a year after the original onset that investors seem to have decided that this former Spanish colony was in fact a Latin rather than an Asian country and attacked.)

Alternatively, one may argue that the political commitment to a fixed exchange rate is itself subject to herding effects. This is perhaps clearest in the European crises: once Britain and Italy have left the ERM, it is less politically

costly for Sweden to abandon its peg to the deutsche mark than it would have been had Sweden devalued on its own.

One may also argue, of course, that contagion reflects irrational behavior on the part of investors, either because individuals are really irrational or because money managers face asymmetric incentives. South Korea has few strong trade links with the troubled economies of Southeast Asia; yet a fund manager who did not reduce exposure in South Korea, then was caught in a devaluation of the won, might well be blamed for lack of due diligence—after all, Asian currencies have been risky in recent months, haven't they?

As in the case of herding in general, there seems to be positive as well as negative contagion. During the wave of optimism that followed Mexican and Argentine reforms in the early 1990s, countries that had done little actual reform, such as Brazil, were also lifted by the rising tide; and the apparent myopia of markets about Asian risks seems to have been fed by a general sense of optimism about Asian economies in general.

Market Manipulation

Scenarios in which crises are generated either by self-fulfilling rational expectations or by irrational herding behavior imply at least the possibility of profitable market manipulation by large speculators. (Krugman 1996 proposed that such hypothetical agents be referred to as “Soroi.”) Suppose that a country is vulnerable to a run on its currency: either investors believe that it will abandon its currency peg if challenged by a speculative attack, or they simply emulate each other and can therefore be stampeded. Then a large investor could engineer profits for himself by first quietly taking a short position in that country's currency, then deliberately triggering a crisis—which he could do through some combination of public statements and ostentatious selling.

The classic example of this strategy is, of course, George Soros's attack on the British pound in 1992. As argued in the case study below, it is likely that the pound would have dropped out of the ERM in any case; but Soros's actions may have triggered an earlier exit than would have happened otherwise.

In addition to being the classic example of how a market manipulator can generate a crisis, however, Soros's attack on the pound may be the *only* example in recent years. At any rate, it is hard to come up with any other clear-cut examples. This has not, of course, prevented politicians from blaming market manipulation in general and Soros in particular for currency crises, even when there is no evidence that they have played a role.

Why are such engineered speculative attacks rare? One answer is that the scope for self-fulfilling crises is actually rather limited: most currencies tend to get attacked soon after it becomes apparent that they are vulnerable to such an attack. As argued earlier, this will happen if a continuing deterioration in the fundamentals is predictable: knowing that an eventual collapse of the exchange regime is inevitable, investors will try to anticipate the collapse, thereby bringing it forward in time, and thus will tend to attack as soon as such an attack

can succeed. In Krugman (1996) I also argued that the existence of Soros himself tends to advance the date of speculative attack: since everyone knows that a currency that is vulnerable to a self-fulfilling attack presents a profit opportunity for large players, investors will sell the currency in anticipation that one or another of these players will in fact undermine the exchange regime—and in so doing investors will force the collapse of the regime even without the aid of a Soros.

Of course, if currencies spontaneously collapse as soon as a potential profit for Soros appears, this will eliminate the opportunity for Soros to make profits; but if nobody is playing that game, investors will no longer expect collapsible currency regimes to be collapsed. This paradox is essentially the same as that which arises in the context of struggles for corporate control: a takeover attempt will not be profitable if the potential gains are already in the stock price, but there will be no gains if there is no takeover attempt. From a modeling point of view this seems to suggest the absence of any equilibrium, unless one introduces sufficient “noise” into the story. In practical terms we may simply note that for whatever reason, the success of Soros at making money by provoking the pound’s devaluation seems thus far to have been a one-time event.

8.1.4 Case Study 1: The ERM Crises of 1992–93

In the fall of 1992 massive capital flows led to the exit of Britain, Italy, and Spain from the Exchange Rate Mechanism of the European Monetary System. (Strictly speaking, they remained within the system itself.) In the summer of 1993 a second wave of attacks led to a decision to widen the exchange rate bands of that system, essentially to allow the French franc to depreciate without any formal exit. In subsequent years events have unfolded in somewhat ironic ways: France, having been given leeway for a somewhat weaker franc, chose not to use it, returning to the original narrow band against the mark; while the boom in the U.K. economy that followed the exit from the ERM has now pushed the pound *above* the rate at which it originally exited. Still, the ERM crises remain one of the classic episodes of speculative attack, and they are the most thoroughly studied such episode.

Part of what makes the ERM crises so classic is that they so clearly demonstrate the importance of second-, as opposed to first-, generation models. The European countries attacked in 1992 and 1993 did not fit the canonical crisis model at all. In all cases, governments retained full access to capital markets, both domestic and foreign. This meant, first of all, that they had no need to monetize their budget deficits; and indeed they did not have exceptionally rapid growth of domestic credit (Eichengreen, Rose, and Wyplosz 1995). It also meant that they were not suffering from any ironclad limitation on foreign exchange reserves: they remained able to borrow on foreign markets and indeed clearly retained the ability to stabilize their currencies had they so chosen simply by raising domestic interest rates sufficiently. Finally, all of the target economies had low and stable inflation both before and after the crisis.

What, then, provided the motivation for devaluation that we have seen is a crucial ingredient for second-generation models? The answer was clearly unemployment due to inadequate demand, and the resulting pressure on monetary authorities to engage in expansionary policies—policies that could not be pursued as long as the countries remained committed to a fixed exchange rate—was the essential fuel for the crises. Essentially we can think of European governments as facing a trade-off between the political costs of unemployment over and above its “structural” or “natural” level, on one side, and the political costs of dropping out of the ERM, on the other.

Behind the unemployment problem, in turn, was an unusual situation triggered by the interaction between the fall of the Berlin Wall and the role of the deutsche mark as the de facto key currency of the European Monetary System. The heavy expenditures by Germany on its newly reunited eastern Länder amounted to an expansionary fiscal policy for western Germany; the Bundesbank, like the Federal Reserve faced with the deficit spending of the 1980s, responded with a tight monetary policy. However, other European countries pegging to the mark found themselves obliged to match the tight monetary policy without the fiscal expansion; thus they were pushed into recession.

All the ingredients for crisis, then, were in place. However, four special aspects of the ERM crises should be noted. First was the role of a large actor—George Soros—in triggering the crisis. Soros had divined early in the game the possibility of a sterling devaluation and set about discreetly establishing a short position in the form of a number of short-term credit lines, totaling approximately \$15 billion. He was thus in a position to profit from a collapse of the exchange regime and did in fact attempt by his own sales to precipitate that collapse. It remains unclear, however, how important a role his actions actually played; it is arguable that the fundamental reasons for the crisis would have set it off even without any action on Soros’s part. A guess might be that he advanced the date of the crisis by only a few weeks or months.

Second, the crisis demonstrated the near irrelevance of foreign exchange reserves in a world of high capital mobility. The central banks of both Britain and Italy had substantial reserves and were also entitled under ERM rules to credit lines from Germany. Thus they were able to engage in direct foreign exchange intervention on a very large scale—Britain appears to have bought some \$50 billion worth of sterling over the course of a few days. However, this intervention was sterilized—that is, it was offset by open market operations so as to avoid reducing the size of the monetary base. And it was clearly ineffectual. It became clear that sterling could be defended only by a domestic monetary contraction, and after only two (?) days of higher interest rates the Bank of England abandoned the fixed parity.

Third, retrospectives on the ERM crises turn up a surprising fact: the crises seem to have been virtually unanticipated by the financial markets. Rose and Svensson (1994) show that interest differentials against the target currencies did not begin to widen until August 1992—a month before the breakup.

Finally, a remarkable fact about the ERM crises is that the countries that

“failed,” and were driven off their pegs, did better by almost any measure in the following period than those that succeeded in defending their currencies. The United Kingdom, in particular, experienced a rapid drop in its unemployment rate without any corresponding rise in inflation.

8.1.5 Case Study 2: The Latin Crises, 1994–95

The Latin crisis of 1994–95 was similar to the ERM crises in some respects, quite different in others. Above all, its consequences were much more severe for the affected economies.

Claims that several Latin currencies, in particular the Mexican and Argentine peso, were overvalued were common among economists as early as the beginning of 1993 (see, e.g., Dornbusch 1994). These claims were based on one or more of three observations: purchasing power parity calculations, which suggested that costs and prices had gotten out of line with those of trading partners; large current account deficits; and slow growth (in the case of Mexico) or high unemployment (in the case of Argentina), suggesting that there would be room for monetary expansion if only the exchange rate were not a constraint.

In Latin America, however, as in Europe, these warnings appear to have been more or less ignored by financial markets. Government officials were adamant that devaluation was not under consideration, and the markets believed them. Through the whole of 1993 interest premiums on the pesos remained low, and the current account deficits were easily financed.

Mexico experienced a deteriorating situation over the course of 1994. Political uncertainty emerged following two unexpected events: the peasant rebellion in Chiapas and the assassination of the ruling party’s presidential candidate. The government also appeared to relax monetary and fiscal discipline in the run-up to the presidential election. Foreign capital inflows began to dry up, and there was a rapid decline in foreign exchange reserves. A critical point was reached when the government found itself unable to roll over the Tesobonos, dollar-denominated short-term debt.

Faced with this external pressure, Mexico decided shortly after the election to devalue the peso. However, the devaluation was botched in several respects. First, the size of the devaluation, at 15 percent, was widely regarded as inadequate; thus the government had sacrificed the credibility of its commitment to a fixed rate without satisfying markets that the devaluation was behind it. Second, by consulting business leaders about the plan, the government in effect gave Mexican insiders the opportunity to make profits at the expense of uninformed foreign investors, helping to discredit the policy. Finally, Mexican officials managed to convey a sense of both arrogance and incompetence to foreign investors in the days immediately following the devaluation.

Perhaps for these reasons, the initial small devaluation was followed by a near complete loss of confidence in Mexican policies and prospects. The peso

quickly fell to half its precrisis value; the resulting spike in import prices caused inflation, which had previously fallen to low single-digit levels, to soar. In order to stabilize the peso and the inflation rate, the government was obliged to raise domestic interest rates to very high levels, peaking at above 80 percent. The high rates in turn led to a sharp contraction in domestic demand, and real GDP fell by 7 percent in the year following the crisis.

Fears that the crisis would undermine Mexico's political stability led the United States to engineer a massive international loan to the Mexican government, hoping to buy a breathing space while confidence was restored. This effort was successful: during 1996 economic growth resumed, and Mexico regained normal access to international capital markets, repaying the emergency loan ahead of schedule.

Argentina had initially hoped that its very different currency regime—a currency board system, with the peso rigidly linked to the dollar at a one-for-one parity, and with every peso in the monetary base backed by a dollar of reserves—would protect it from any spillover from the Mexican crisis. In effect, Argentina had ensured that it was not vulnerable to the kind of crisis envisaged by the canonical crisis model. Argentina might also have expected that the absence of any strong trade linkage with Mexico would prevent any contagion. However, speculators attacked the currency nonetheless, presumably suspecting that Argentina might abandon the currency board in order to reduce the unemployment rate. (We might call this the revenge of the second-generation model.)

Under the currency board system, the capital outflows led to a rapid decline in the monetary base. This, in turn, created a crisis in the banking system, which contributed to a downturn milder than Mexico's but still extremely severe. International official loans, albeit on a smaller scale than Mexico's, were needed to prop up the banking system.

In contrast to Mexico, Argentina chose to hang tough on its exchange rate regime, betting that the financial markets would eventually realize that its commitment was absolute and that the pressure would ease. And in 1996 Argentina also resumed economic growth.

The Latin crises thus share some common features with the European experience but also show some strong differences. The most striking commonality was the apparent failure of financial markets to anticipate the crises, or even give any weight to the possibility of a crisis, until very late in the game—in spite of widely circulated warnings by economists that such crises might be brewing. The most striking difference was in the aftermath of crisis. Suppose that one thinks of Britain and France as representing one matched pair—a country that gave in to the pressure and one that did not—while Mexico and Argentina are another. In the first case the devaluing country actually did very well postdevaluation (leading to some facetious suggestions that a statue of George Soros be erected in Trafalgar Square); the nondevaluing country did less well but did not suffer any dramatic catastrophe. In the second case both

countries suffered almost incredibly severe recessions, but the devaluing country was worse hit, at least initially.

8.1.6 Case Study 3: Asian Crises

The Asian situation is still in flux at the time of writing, information is still incomplete, and no careful economic studies are yet available. So this can only be a brief and provisional summary.

During 1995 a number of economists had begun to wonder whether the countries of Southeast Asia might be vulnerable to a Latin-type crisis. The main objective indicator was the emergence of very large current account deficits. Closer examination also revealed that several of the countries had developed worrying financial weaknesses: heavy investment in highly speculative real estate ventures, financed by borrowing either from poorly informed foreign sources or by credit from underregulated domestic financial institutions. It is now known that during 1996 officials from the International Monetary Fund (IMF) and World Bank actually began warning the governments of Thailand, Malaysia, and other countries of the risks posed by their financial situation and urged corrective policies. However, these warnings were brusquely rejected by those governments.

As in the case of the other regional currency crises, financial markets showed little sign of concern until very late in the game. The extraordinary growth record of the region seems to have convinced many that the usual cautions did not apply. (One pension fund manager described to me a briefing on Indonesian prospects by someone from Moody's. Some members of the audience had expressed worry about the reliability of the data and the financial reports they had seen. His response was that you should think of it as being like a Javanese shadow puppet show—you couldn't actually see the puppets, but you could see their shadows, and that told the story.)

The slide toward crisis began with an export slowdown in the region, partly due to the appreciation of the dollar (to which the target currencies were pegged) against the yen, partly to specific developments in key industries, partly to growing competition from China. With export growth flagging, the overbuilding of real estate—especially in Thailand—became all too apparent. In turn, dropping real estate prices pulled down stock prices and placed the solvency of financial institutions in question.

Up to this point, the developments were mainly a domestic financial crisis, similar in general outline to the bursting of Japan's "bubble economy" in the early 1990s. During the first half of 1997, however, speculators finally began to wonder whether the financial distress of Southeast Asian countries, especially Thailand, might provoke them to devalue in the hope of reflating the economy. The growing suspicion that such a move might be in prospect, despite government insistence that it was not, led to widening interest premiums; these in turn increased the pressure, both by adding deflationary impetus and by creating cash flow problems for financially stressed businesses.

On 2 July Thailand gave in to the pressures and floated the baht; as in the other crises, this led to speculation against other regional currencies and was followed shortly by somewhat smaller devaluations in Malaysia, Indonesia, and the Philippines. The wave of devaluations, and the troubled financial picture revealed by the crisis, shook investor confidence; in an effort to regain that confidence, all of the countries involved have imposed new fiscal austerity. Thailand received an emergency loan from the IMF; part of the conditionality was a cleanup of its financial system.

At this point the real consequences of the crisis are still to be revealed. There seems to be general agreement that Thailand, like Mexico, will suffer an initial blow to its growth. Typical estimates are that it will go from the 9 percent average rates of recent years to roughly zero growth over the next year. The impact on neighboring economies is a subject of considerable dispute, with the IMF predicting only a small impact while many private economists predict much more severe slowdowns.

At this point it remains unclear how far the contagion will spread. South Korea is the most interesting case: it has severe internal financial problems and a massive current account deficit, but it has few real linkages to the Southeast Asian economies. At the time of writing there does not seem to have been any pressure on China, even though the giant nation is reported to have massive quantities of bad internal debt.

An interesting counterpoint to the Latin experience is provided by Hong Kong, which like Argentina has a currency board and is pegged to the U.S. dollar (and intends to remain that way, even though it is politically now part of China). After a brief probing, financial markets seem to have decided that the Hong Kong dollar is not at risk, and what is now the Special Administrative Region thus seems to have insulated itself from the crisis.

The most peculiar aspect of the Asian crisis has been the reaction of some of the region's leaders. Malaysia's prime minister, Mahathir bin Mohamed, has taken the lead, blaming the crisis on the conspiratorial activities of George Soros (whom he has described as a "moron"), prompted by U.S. government officials. Unless new evidence surfaces, this claim is even odder than it sounds: as far as market participants are aware, Soros was not even a player in this crisis and indeed seems to have guessed wrong, *buying* Malaysian ringgit. Mahathir temporarily imposed limits on stock trading intended to stop the alleged conspiracy and has made public calls for an end to currency trading that have made financial markets understandably nervous that he might try to impose capital controls.

8.1.7 Macroeconomic Questions

Although the currency crises of the 1990s have inspired a good deal of research, one area remains neglected. What are the macroeconomic impacts of crisis, and why in particular have they differed so much between episodes?

The quick review of the main episodes in the decade to date indicates pretty

clearly that crises in the 1990s are best described by second-generation models—that is, the motives for devaluation lie in the perceived need for more expansionary monetary policies rather than in budget deficits and inflation. One might therefore suppose that when a country gives in to temptation it would receive a reward—that whatever the cost in political capital or long-term inflation credibility, there would at least be a payoff in terms of short-run economic expansion. And this was exactly what happened in the European crises; indeed, those countries that abandoned their principles seem to have gone completely unpunished.

In the Latin crisis, however, and at least as far as we can tell in the Asian crises, the decision to devalue seems to have led to serious adverse short-run consequences on all fronts. Instead of permitting reflation, the devaluations seem to have led to even more severe contraction. Why? And why has the experience been so different?

Systematic attempts to answer these questions are still lacking (although papers prepared for the NBER's conference on currency crises may supply some answers). A quick conjecture is that the key difference was how well informed markets were about the policy environment in the respective sets of countries. A British devaluation, while it may have shattered the credibility of the current chancellor of the exchequer, did not shake confidence in British institutions in general; markets still had full confidence that the government of the United Kingdom would continue to allow free markets to function, that it would honor its debts, that the Bank of England would continue to worry about inflation, and so on. Thus, once the pound had depreciated substantially, markets were prepared to believe that investment in Britain was actually a good bet.

In Mexico, by contrast, the devaluation made markets question the whole premise that the country was now run by reliable, reformist technocrats. As the crisis deepened, so did concerns that a backlash against the reformers would lead to a return to dirigiste policies—and these concerns, by promoting further capital flight, deepened the crisis. One might summarize Mexico's situation in 1995 as one in which the country had to offer very high interest rates to offset the nervousness of investors about the country's *political* future—and in which that nervousness was largely the result of concern about the political damage inflicted by high interest rates. The rescue package organized by the United States may be seen as an attempt to break this vicious circle.

The Asian crisis, like that in Latin America, seems to have shaken basic confidence in the countries much more than the crisis in Europe. Investors are now emphasizing weaknesses in the political and institutional environment—lax bank regulation, widespread corruption, grandiose policies—that were obvious even to casual observers before this year but that were brushed off as minor blemishes on the Asian miracle until that miracle hit a speed bump.

At this point, however, this is merely loose speculation. More careful analyses are badly needed.

8.1.8 Can Currency Crises Be Prevented?

A world in which major currency crises occur at an average rate of one every nineteen months is not a very comfortable one for economic policymakers. What, if anything, can be done to prevent them, or at least to keep them from happening so often?

One possibility would be to return to the world of the early 1960s, an era in which extensive capital controls prevented the massive flows of hot money that now drive crises. Something like this seems to be what Mahathir is proposing, but nothing along these lines seems likely in the near future.

Another possibility would simply be for countries to follow sound and consistent policies, so that they are not attacked by speculators. There is a lot to be said for this; many crises do seem to be the result of obvious inconsistencies between the domestic policies of a country and its exchange regime. However, the main point of second-generation models may be stated this way: the real cause of currency crises is not so much what you are actually doing, as what the financial markets suspect you might *want* to do. Britain's monetary policy as a member of the ERM was impeccably correct; but Soros and others correctly suspected that when push came to shove the government would choose employment over the exchange rate. In order to have prevented such an attack, the British government would have had to change not its policies but its preferences.

This point also explains why institutional arrangements like currency boards do not offer secure protection against speculative attack. A currency fully backed by reserves means that one cannot be mechanically forced to devalue; but it does nothing to prevent you from choosing to devalue, even if you have insisted that you will not and have up until now pursued policies consistent with a fixed rate.

Incidentally, these considerations have considerable bearing on European prospects. It now appears very likely that a core group of European countries will formally enter European Economic and Monetary Union (EMU) at the beginning of 1999, and they may well lock the parities as early as May 1998. However, actual euro notes will not replace national currencies for several years. As a growing number of commentators have noticed, this means that it will still be technically quite possible for a country to drop out of EMU during this interim period—which means that currency crises are quite possible *after* EMU supposedly has gone into effect.

How can a country ensure that it will not give in to speculative attack? It can attempt to raise the stakes, by placing the prestige of the government on the line; it can sign solemn treaties; and so on. The only surefire way not to have one's currency speculated against, however, is not to have an independent currency. True monetary union is one answer to the problem of currency crisis.

The other answer is simply not to offer speculators an easy target, by refusing to defend any particular exchange rate in the first place. Once a country

has a floating exchange rate, any speculative concerns about its future policies will already be reflected in the exchange rate. Thus anyone betting against the currency will face a real risk, rather than the one-way option in speculating against a fixed rate.

Reasoning along these lines has convinced a number of economists working on currency crises that the ultimate lesson of the crisis-ridden 1990s is that countries should avoid halfway houses. They should either float their currencies or join currency unions. It remains to be seen whether this stark recommendation will survive closer scrutiny.

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2. *Kenneth Rogoff*

Perspectives on Exchange Rate Volatility

8.2.1 Introduction

Will the introduction of the euro mark the beginning of the end of the modern floating exchange rate era? After nearly a quarter-century of volatile major-currency exchange rates, do we think we now understand exchange rate fluctuations and know how to deal with them? This paper offers a rather sober view of what economists know—and do not know—about the causes and consequences of exchange market volatility.

8.2.2 The Nagging Persistence of Exchange Rate Volatility

During the macroeconomic chaos of the 1970s, the popular perception among economists was that if governments could only manage to whip inflation, calm in foreign exchange markets would surely follow. In the meantime, the only advice economists could give for dealing with exchange rate volatility was to run for cover. The 1970s view laid the blame for unstable exchange rates squarely at the doorstep of the monetary authorities. If officials' plans for monetary policy were hard to predict—and during the 1970s, they *were* hard to predict—then there was no way of ruling out sustained large divergences in countries' price levels.¹ Even a very loose interpretation of the doctrine of “purchasing power parity” suggests that price level instability is incompatible with exchange rate stability.

The theoretical case against the hapless monetary authorities was greatly strengthened by Rudiger Dornbusch's (1976) celebrated “overshooting” model. By introducing forward-looking “rational” expectations into the canonical Keynesian model of open economy macroeconomics (due to Mundell and Fleming), Dornbusch showed that monetary policy shifts can easily lead to disproportionately large movements in exchange rates. Under certain plausible assumptions, the sluggishness of wages and prices means that the exchange rate must bear a disproportionate burden of the adjustment to monetary shocks, at least in the short run. Ergo, a little monetary instability can lead to a lot of exchange rate instability; a lot of monetary instability can lead to near chaos—pretty much the situation in the 1970s, at least in comparison with the 1950s and 1960s.

The theory seemed to fit the facts, and it was intrinsically very elegant to boot (a big selling point in any science). Unfortunately today, as inflation con-

1. Obviously, money demand instability also became much more severe in the 1970s, though in principle such instability can be offset by adjustments in the money supply.

tinues to subside, it is becoming increasingly clear that monetary instability is at most a piece of the exchange rate volatility puzzle. It certainly cannot carry the full burden—or the blame—attributed to it by monetary models of the 1970s (or 1980s, for that matter). Consumer price index (CPI) inflation across Europe, the United States, and Japan has fallen drastically over the past twenty years, converging toward the 1 to 2 percent range. (Taking into account the much-ballyhooed upward bias in the CPI, “true” cost-of-living inflation is probably only 0 to 1 percent.) Moreover, market concern over the possibility of a relapse into high inflation continues to recede as improvements in monetary institutions—especially greater *de jure* and *de facto* central bank independence—strengthen the hand of anti-inflation conservative elements within governments.

Yet despite the drop in inflation, exchange rates across the big three currencies (the dollar, the euro, and the yen) are still remarkably volatile. Can concern over long-run divergences in inflation rates possibly explain why, between the spring of 1995 and May 1997, the dollar appreciated by roughly 60 percent against the yen and 30 percent against the mark? Indeed by comparison with some of the larger monthly swings in the major currency cross-rates, the mid-August 1997 devaluations in Asia (ranging from 17 to 34 percent cumulated through mid-September) do not seem quite so horrific. One may well ask, has the conquest of inflation brought any drop at all in major-currency exchange rate volatility?

Figure 8.1 asks just this question for the yen-dollar, mark-dollar, and trade-weighted dollar exchange rates. The figure divides the floating rate period 1975–98 into three-year intervals and looks the volatility of month-to-month changes in the exchange rate within each period.² Interestingly, the standard deviation of month-to-month changes in the trade-weighted dollar (*filled diamonds*) has indeed been steadily dropping since the late 1980s, from a high of 2.7 percent per month during 1987–89 to 1.6 percent over the most recent period.

The bilateral dollar rates against the deutsche mark and yen are generally much more volatile, each averaging 3.3 percent per month over the entire period versus 2.1 percent for the trade-weighted dollar. As the graph shows, volatility of the mark-dollar (now euro-dollar) rate has been falling, though not as dramatically as for the trade-weighted dollar. The volatility of the yen-dollar rate has barely fallen at all, remaining almost 3.0 percent per month.

Figure 8.2 also provides a different perspective, comparing the evolution in volatility of the trade-weighted dollar with that of the trade-weighted yen and deutsche mark. Not surprisingly, the volatility of the trade-weighted mark is far lower than that of the dollar, with the standard deviation averaging only 1.2

2. The standard deviations in figs. 8.1 and 8.2 are calculated as $[\sum (\Delta e_t)^2/n]^{1/2}$, where Δe_t is the month-to-month change in the log exchange rate and n is the number of observations. Note that we are implicitly assuming that the exchange rate follows a random walk. As we discuss below, this seems to be a very reasonable approximation.

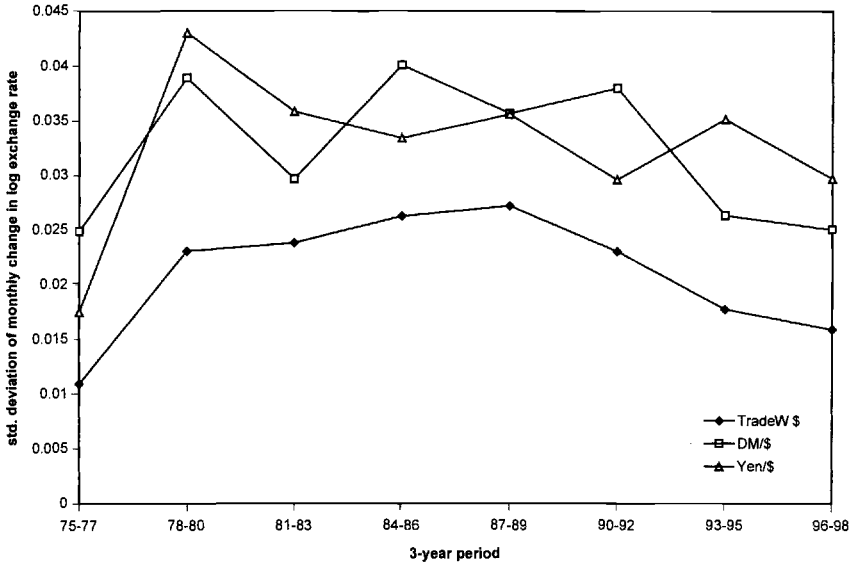


Fig. 8.1 Standard deviation (zero centered) of month-to-month changes in log exchange rate, by three-year intervals, 1975–98

Source: IMF, *International Financial Statistics* (Washington, D.C., 1998), CD-ROM.

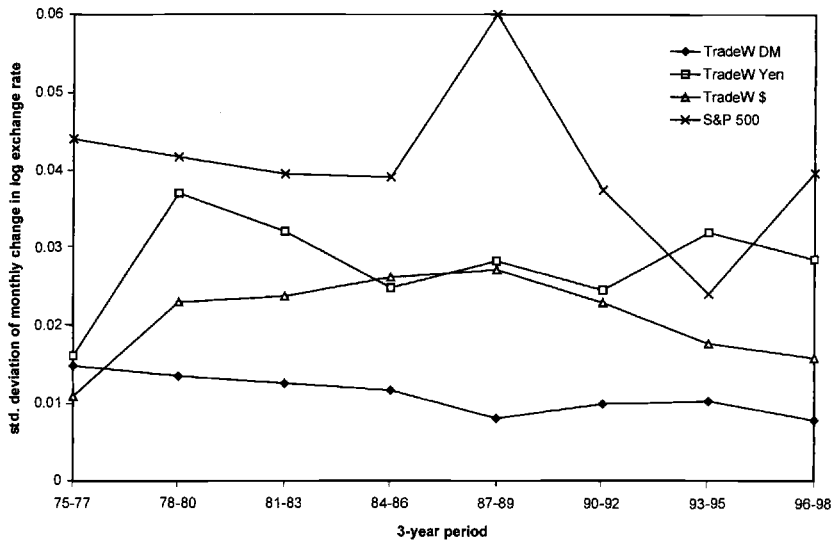


Fig. 8.2 Standard deviation (zero centered) of month-to-month changes in log trade-weighted dollar, deutsche mark, and yen, by three-year intervals, 1975–98

Source: IMF, *International Financial Statistics* (Washington, D.C., 1998), CD-ROM.

percent over the entire period, dropping to 0.8 percent in the 1996–98 subperiod. The low volatility of the trade-weighted mark is not surprising; a large part of Germany's trade is with other countries in the former European Monetary System (EMS). Even counting occasional realignments, cross-country EMS exchange rates were relatively stable even before the advent of the euro.

The trade-weighted yen has been much more unstable in recent years than the dollar or the deutsche mark (euro), and its volatility has even risen slightly since the mid-1980s. Partly this is due to the fact that many of Japan's Asian trading partners peg to the dollar rather than the yen; the fact that Japan's economic growth has been out of synch with the United States and Europe is probably also a factor.

Finally, to put the exchange rate numbers in perspective, figure 8.2 includes a measure of the volatility of the S&P 500 stock index. As one can see, stock price changes, with a standard deviation of 4.1 percent over the entire period, are generally even more volatile than exchange rates (including even the bilateral rates in fig. 8.1).³

Thus, overall, exchange rate volatility has indeed fallen somewhat in recent years. Whether one can attribute this decline to the general fall in inflation, or to the switch in central bank operating procedures toward greater emphasis on smoothing fluctuations in very short-term interest rates, is unclear. But what is clear is that despite great successes in the battle against inflation, exchange rate volatility across the major currencies is still quite significant.

8.2.3 Explaining Exchange Rate Fluctuations (or Not)

In retrospect, economists should have realized that the elegant theories of the 1970s overstated the importance of monetary factors—and ergo the role of central banks—in causing exchange rate volatility. Ever since the early 1980s, well before low inflation had settled in, a steady stream of negative empirical results began to cast doubt on monetary instability and overshooting as the key elements of exchange rate volatility. Researchers have long been finding that standard monetary models, even when they appear to fit the data well within a given sample period, tend to perform poorly in out-of-sample testing.⁴

The extent to which monetary models (or, indeed, *any* existing structural models of exchange rates) fail to explain even medium-term volatility is difficult to overstate. The out-of-sample forecasting performance of the models is so mediocre that at horizons of one month to two years they fail to outperform a naive random walk model (which says that the best forecast of any future exchange rate is today's rate). Almost incredibly, this result holds *even* when the model forecasts are based on actual realized values of the explanatory variables.

3. Obstfeld and Rogoff (1996, chap. 9) also made this point.

4. This result was demonstrated for various major currency exchange rates in Meese and Rogoff (1983a, 1983b) and has since survived extensive empirical testing. For an excellent survey of the literature, see Frankel and Rose (1995).

What does this mean, exactly? Examples of explanatory variables in structural exchange rate equations are countries' relative output growth, interest rates, and money supplies. Obviously, if these variables are extremely hard to predict (say because one or both countries have highly erratic monetary policy), then of course it will be difficult to predict exchange rates one year hence. Prediction will be difficult no matter how well a model can explain exchange rate changes after the fact. But the inability of models to forecast exchange rates runs deeper than that. It turns out that even if one gives models the (seemingly prohibitive) advantage of forecasting with actual realized (one year hence) values of outputs, interest rates, and the like, they *still* fail to outperform the naive random walk model. True, this extreme result breaks down at very long horizons, over two years (see Meese and Rogoff 1983b; Mark 1995), but again even this success relies on using out-of-sample information about the explanatory variables. Therefore, it is by no means established that monetary models can forecast exchange rates in any meaningful way.

The skeptical reader might react to the negative forecasting results we have been discussing by saying to himself or herself: "Well, surely a market-based variable such as the forward exchange consistently outpredicts the naive random walk model." Nothing could be farther from the truth. Indeed, as Lewis (1995) noted, hundreds of studies have consistently found that, if anything, forward exchange rates tend to point in the wrong direction! More precisely, in regressions of the actual realized change in the spot rate on the "forward premium" (the difference between today's forward rate and today's spot rate), one tends to find a negative correlation! A literal interpretation of this result says one *can* use the three-month forward rate to predict the spot rate three months hence. But (ignoring risk), the money-making strategy involves betting *against* the forward rate. The results in table 8.1 for the dollar-yen and dollar-mark thirty-day forward rates are representative of the kind of results one finds in this literature.

If the forward rate were truly an unbiased predictor of the future spot rate, one would expect to find coefficient β_1 on the forward premium near one (on average if the forward rate is 4 percent above today's spot rate, the realized exchange rate will be 4 percent above as well.) Instead, the coefficient β_1 is

Table 8.1 Forward Premium Puzzle

Exchange Rate	β_0	β_1
Dollar-yen	.005 (.004)	-2.62 (1.01)
Dollar-mark	-.001 (.003)	-.64 (1.15)

Data Source: Datastream International.

Note: Representative regressions for the dollar-yen and dollar-mark exchange rates; nonoverlapping monthly data, 1989:2-97:9. Equation is $e_{t+1} - e_t = \beta_0 + \beta_1(f_t - e_t) + \varepsilon_{t+1}$, where e_t is the log of the time t spot rate and f_t is the log of the thirty-day forward rate. Numbers in parentheses are standard errors.

actually negative. (Here it is not significantly less than zero for the dollar-mark rate, but in larger samples, it often is.)

Of course, there is no theoretical quandary here, since the forward rate incorporates a risk premium, and it is perfectly possible that on average, the risk premium tends to outweigh the trend change in exchange rates (and tends to be negatively correlated with it). It is also quite likely that there is a “peso problem” in the data—the floating rate period is still very young, and markets incorporate expectations of unlikely events (say a significant global conflagration) that (happily) have not been witnessed in the sample (see Rogoff 1980; Lewis 1992). These expectations appear to impart a bias in the forward rate that would disappear in a sufficiently large sample. Overall, though, a reasonable interpretation of results is that there is simply no evidence that the forward rate outperforms the random walk model.

Lest we leave the reader with an image of total darkness in the realm of exchange rate forecasting, one should mention a couple of bright spots. First, there is an increasing consensus across a broad number of studies that purchasing power parity (PPP) considerations do matter for long-run exchange rate determination (see Froot and Rogoff 1995; Rogoff 1996). (The most widely tested form of PPP test posits that over long periods, changes in exchange rates reflect cumulative inflation differentials.) The half-life of PPP deviations, however, appears to be extremely long, on the order of three to four years. That is, if a 10 percent appreciation of the nominal yen-dollar rate leads to a corresponding change in the real (CPI-adjusted) yen-dollar rate, then, on average, roughly 5 percent of the shock will have dissipated after four years. This, of course, does not tell us what happens to the nominal exchange rate because part or all of the adjustment can take place through relative price movements rather than the exchange rate. But at least it is evidence that there is some anchor out there for exchange rates.

Second, newer theoretical models emphasizing nonmonetary factors have increasingly come to supplant the classic Keynesian framework of Mundell, Fleming, and Dornbusch. These “new open economy macroeconomics” models emphasize other factors in addition to money, including government spending and productivity shocks. Whereas it is extremely unlikely that even these newer models will be able to explain very short term fluctuations in exchange rates, early evidence suggests that the other factors they emphasize may be at least as important as monetary factors in medium- to long-run exchange rate determination (see Obstfeld and Rogoff 1996, chaps. 4 and 10).

Overall, the empirical evidence on exchange rates overwhelmingly supports the view that simply making monetary policy more stable and predictable can only go part way toward quelling exchange rate volatility. The steady deregulation of global capital markets since the 1960s and the stunning pace of innovation in global finance make stabilizing exchange rates a much more complex problem that it was in the halcyon days of the Bretton Woods system of fixed exchange rates.

8.2.4 What Are the Costs of Exchange Rate Volatility?

Though simply bringing down inflation is not enough, it *is* possible in principle to stabilize the yen-dollar and mark-dollar exchange rates should global monetary authorities attach a sufficiently high weight to that objective. For example, the United States and Japan could in principle slavishly peg their currencies to the euro. Other mechanisms for fixing exchange rates might allocate the right to steer global monetary policy more evenly, but as the European experience has shown us, the coordination problems involved in such a system can be quite severe, absent political integration. I will return to these issues in the final section of this paper.

Here I want to tackle a different question. How serious are the costs of exchange rate volatility, and how great would the gains be to removing it? At a casual level, it would seem that the costs of exchange rate volatility are rather obvious. Exchange rate volatility presents significant problems for exporters and importers, not to mention any company considering building a plant abroad. At a mundane level, the estimated cost of a two-week trip to Europe can easily rise or fall 10 percent between the time one embarks and the time one returns. But if society is to devote significant resources to squeezing major-currency exchange rate volatility out of the system, it would be nice to have a more quantitative feel for the benefits, rather than simply relying on casual empiricism. Is it a wrench in the works of global trade (a perspective one often hears from Europe), or is it merely a relatively minor irritant?

An obvious point to make is that the ability of firms and individuals to hedge against exchange rate risk places an upper bound on the size of the costs. Hedging may be expensive, but not infinitely so, especially as international capital markets deepen and opportunities for portfolio diversification multiply. Even without hedging exchange risk through financial instruments, a company may still be able to mitigate the effects of exchange rate volatility by simply shifting its purchases and sales in response to price signals. The same is true at the individual level; when the costs of German cars rise due to an appreciation of the euro, Americans can shift demand toward domestic and Japanese models. Demand for international travel is similarly quite price elastic. There is no question that more Europeans come to visit New York when the dollar is weak. Thus the ability of individuals and companies to shift demand across time and goods tempers the costs of volatility.

However, there is an important sense in which the above discussion misses a fundamental point. Even with perfect forward markets—in all things, not just exchange rates—there is no way for the world as a whole to hedge against global risks. For this reason, much of literature on risk premiums in forward exchange markets—or in stocks and bonds, for that matter—neglects the inconveniences of the trading of individual risk and focuses on the equilibrium costs of global risks. Generally speaking, though, this line of reasoning leads to the conclusion that the costs of insuring against global risks should not be

all that large, since global output is simply not all that volatile. For example, the standard deviation of postwar U.S. consumption has averaged under 3 percent per year. Even if this risk cannot be diversified away, it is not easy to construct models where the welfare effects are large.⁵ (This same logic underlies the so-called equity premium puzzle. How can stocks offer such a consistently high rate of return relative to bonds if the risks to aggregate output are so low?)

Thus the benefits of eliminating exchange rate volatility must lie elsewhere, since the benefits of reducing consumption volatility (and consumption is presumably the ultimate welfare objective) are not likely to be very large even if exchange rates truly are a major cause. Of course, all of this discussion is predicated on the assumption that markets are very complete and global volatility is what matters. This view is too extreme, even if it is true that global capital market innovation is constantly reducing the costs of diversification. Still, these kinds of considerations should cause one to question just how great an evil exchange rate volatility can be.

Empirical evidence comparisons on the volatility of output and trade under fixed versus flexible exchange rates tend to underscore the difficulty of detecting the real effects of exchange rate volatility. It is true that if one looks across a broad spectrum of postwar experiences with fixed and flexible exchange rates, real rates are far more volatile under floating.⁶ The reason is that domestic CPIs tend to fluctuate far less than nominal exchange rates. Thus if the nominal exchange rate is fixed, fluctuations in the real exchange rate are inevitably going to be much less. One can try to explain away this fact by arguing that flexible rates tend to be adopted precisely in situations where real shocks are more volatile (indeed, this is precisely the prescription of the classic Mundell-Fleming model). But a careful look at the historical circumstances under which shifts between fixed and floating rates have taken place shows that this argument is quite weak. Real exchange volatility tends to rise precipitously within weeks, if not hours, of when a country shifts to flexible rates. Whereas it is possible that there has been reverse causality in some circumstances, the finding that real exchange rates become more volatile after floating is universal. Surely, the relative rigidity of price levels is the main explanation, not the endogeneity of exchange rate regimes. (The relative inflexibility of prices compared to exchange rates remains even when one looks at very disaggregated price data, and even when one looks at goods that one would typically regard as highly traded.)⁷

So floating indeed makes real exchange rates more volatile. The open question, however, is whether real exchange rate volatility has an effect on any

5. This point was first raised by Lucas (1988); for a discussion, see Obstfeld and Rogoff (1996, chap. 5).

6. This point is made very forcefully by Mussa (1986).

7. Again, for a survey, see Rogoff (1996).

other macroeconomic variables. Are trade flows greater under fixed rates than flexible rates? Is output, consumption, or investment more volatile? The small number of studies that have looked at this question tend to find that the exchange rate regime has little or no influence on volatility of macroaggregates (see Baxter and Stockman 1989; Flood and Rose 1995). Admittedly, the evidence is far less conclusive or systematic than the evidence on real exchange rate variability. But at the very least, it appears that differences do not (or at least have not yet) jumped out of the data.

A third reason why exchange rate volatility may not be all that problematic comes out of recent efforts to provide microfoundations for the classic exchange rate theories of the 1970s (see Obstfeld and Rogoff 1996, chap. 10). This new research suggests that while exchange rate volatility may have adverse effects, they are not necessarily first order. If the major distortions in the economy include factors such as labor market distortions, tax distortions, and monopoly distortions, then the welfare effects of exchange rate movements depend to a large extent on whether they exacerbate or ameliorate these distortions. At the moment, the empirics of this question are not resolved.

In sum, the costs of exchange rate volatility are not firmly established, and the weight of recent research points to the possibility that they are distinctly smaller than one might have thought previously. We have already seen that stock markets are more volatile than exchange rates. But should one consider stock market volatility a profound macroeconomic problem? Certainly, some regional economies are dramatically affected by big swings in the S&P 500. Wall Street plays a big role in New York City's economy, and the earnings due to the stock market boom are an important factor in the city's recent rising fortunes (just as the bust of the late 1980s made it temporarily much easier to find New York taxicabs in the rain). Overall, though, squelching stock market volatility is not seen as a pressing national priority that should dominate all macroeconomic decisions (as Europe has chosen to make the goal of achieving intra-EMS exchange rate stability).

8.2.5 What Can Be Done about Yen-Dollar-Euro Exchange Rate Volatility?

One can put a different spin on the embarrassing difficulty researchers have in showing that macroeconomic performance is significantly affected by the exchange rate regime. Flood and Rose (1995) have argued that if there is no obvious macroeconomic cost in shifting to fixed rates, and if there might be gains at the microeconomic level (albeit hard to measure), then why not prefer fixed rates? One answer, of course, is that a sustained exchange rate peg may not even be feasible. Over the past decade, speculators have targeted and overrun one fixed rate regime after another, so that today, by any measure, there are very few long-standing (more than ten years) fixed rate regimes. According to

Table 8.2 Foreign Exchange Reserves and the Monetary Base, September 1994

Country	Monetary Base (% of GDP)	Reserves (% of GDP)	Reserves/Base (%)
Belgium	6.7	12.1	180
Denmark	8.6	8.1	94
Finland	11.2	10.4	93
France	4.6	4.6	100
Germany	9.9	6.2	63
Ireland	9.1	16.1	177
Italy	11.9	5.6	48
Mexico	3.9	4.7	120
Netherlands	10.0	13.6	136
Norway	6.3	18.7	297
Portugal	25.0	28.0	112
Spain	12.6	9.6	76
Sweden	13.0	12.1	93
United Kingdom	3.7	4.3	116

Sources: IMF, *International Financial Statistics* (Washington, D.C., 1996), CD-ROM; Obstfeld and Rogoff (1996, 566).

the Bank for International Settlements, the daily flow through foreign exchange markets is \$1.2 trillion per day (Ito and Folkerts-Landau 1996), far in excess of the combined reserve holdings (including gold) of any central bank.⁸ If speculators are determined to attack an individual country's currency, what chance can it have to defend?

Actually, from a technical perspective, most countries have more than adequate reserves (even without borrowing) to defend their currencies against attack, should they be determined to do so. Table 8.2, for example, shows that all of the European countries whose exchange rates fell to attacks in 1992–93 had sufficient reserves to buy back most if not all their outstanding currency supplies.⁹

But the reason exchange rate attacks can still succeed, even where the central bank has more than adequate reserves, is that governments are often extremely reluctant to raise interest rates to the extent necessary to fend off a major sustained attack. In practice, central banks tend to rely on massive sterilized intervention rather than sharp reductions in the monetary base to fend off exchange rate attacks. The idea is to placate speculators by altering the cur-

8. The exchange market flows certainly include some double counting, but on the other hand, so too do gross measures of global foreign exchange reserves (since Japanese holdings of U.S. Treasury bills are obviously a debt for the United States).

9. Table 8.2 does not include central bank forward positions, which if large can complicate the analysis of reserve adequacy. Though forward contracts do not involve any capital outlay, capital gains and losses suffered on forward contracts lower effective reserves. (The Bank of England is rumored to have lost more than \$7 billion dollars this way within a matter of a few hours during the attack on the pound in 1992.)

rency denomination of bond supplies held by the public, an operation that has very little effect on interest rates. While such intervention may or may not be effective at influencing exchange rates during “normal times” (see chap. 3.2 by Kathryn Dominguez), during crises, the effects tend to be far too small to fend off speculators.

What of the example of Europe, which by any measure has achieved a significant level of stability in intra-European rates? Can the EMS serve as a blueprint for the United States, Europe, and Japan? Not in the near term. Even with the high degree of political harmonization in Europe, it is not clear that EMS exchange rates would have stabilized in the mid-1990s if officials had not continued taking dramatic steps toward the ultimate goal of a single currency. It seems highly unlikely that such stubbornly independent regions as Europe, the United States, and Japan would presently be capable of agreeing on a world monetary policy, or that any two or three would be willing to adopt the monetary policy of the third. Of course, if all three regions were willing to permanently relinquish their right to engage in countercyclical monetary policy, and all agreed on targeting zero inflation, the difficulties in coordination would be much less. But even if the (developed) world is an optimal currency area in the sense of Mundell (1961), this does not mean that these countries have the political desire to place nearly as much emphasis on exchange rate stability as the countries of Europe have. The European experience clearly demonstrates that political will is at least as important as any other factor.

What about capital levies on exchange market transactions? Could such taxes, if universally implemented, put “sand in the wheels” of exchange markets as Tobin (1978) advocated? Perhaps, and some recent writers have advocated taking this idea seriously (see, e.g., Eichengreen and Wyplosz 1993). But there are reasons to be profoundly skeptical. First of all, as Kenen (1996) convincingly showed, the practical problems in implementing a Tobin tax are enormous, and problems of evasion would be rampant. And Kenen did not even consider how such laws would create an attractive opportunity for organized crime. The potential costs in terms of microeconomic inefficiency are likely to be considerable, even if difficult to measure. Deep, liquid markets have been essential to many of the financial innovations witnessed by the United States in recent years. These financial innovations have had many spillovers, from making mortgage markets for individuals more liquid to facilitating the corporate restructuring that took place in the United States during the 1980s. Capital market levies would greatly reduce market liquidity and slow the rate of financial innovation throughout the world. It is possible that some smaller economies might benefit from market-based capital levies to help mitigate the notorious “capital inflows” problem. But even this is highly debatable. For the United States, Japan, and Europe, it seems likely that the costs of capital market levies would exceed any potential benefits, even if as a practical matter they did succeed in reducing exchange rate volatility.

8.2.6 Conclusions

Central banks have been remarkably successful in subduing inflation in recent years, but the level of exchange rate volatility among the big three currencies (dollar, euro, and yen) has subsided only slightly. Aside from having some vague idea that financial market shifts are the major culprit behind exchange rate volatility, economists' understanding of the empirical sources of short-term exchange rate volatility is still quite limited. The old idea of purchasing power parity has some force, but only over very long horizons.

At the same time economists are having trouble explaining exchange rate volatility, they are also having difficulty in explaining exactly why it should have profound effects on welfare. Macroeconomic performance is not conspicuously different under fixed versus flexible rates. Nor is it obvious that eliminating exchange rate volatility would have much effect on the volatility of aggregate consumption. So our main conclusion is that exchange market volatility is clearly a nuisance but not necessarily one worth making the focus of international macroeconomic policy.

The view expressed here clearly contrasts with that of mainstream Europe, in which fixed exchange rates have taken on a near religious significance and are thought to be able to cure all evils from unemployment to arthritis. I would argue that European integration has likely been a success in spite of the move to one money, rather than because of it.

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3. Stanley Fischer

It is a pleasure to have the opportunity to try to think through some of the issues with which the Asian crisis has confronted us. I had prepared a systematic presentation, which would have been similar to Andrew Crockett's (chap. 7.3), though no doubt not as persuasive. However, rather than repeat much of what Crockett said, I will comment on a series of topics that have come up during the conference.

Crises That Don't Happen

The natural tendency to focus on crises that have happened may lead to certain biases. Almost by definition, these are outliers, outcomes that are worse

These remarks have not been updated to reflect developments since the conference. The author's views on exchange rate systems have evolved since then. Opinions expressed are those of the author, not necessarily those of the International Monetary Fund.

than anticipated. We should also think for a minute about crises that don't happen.

First, crises don't happen in most countries, most of the time. Second, in some cases, they don't happen because countries have taken action to avoid crises that were coming. For example, Hungary in 1995 was heading for a serious foreign exchange crisis, a debt crisis. They took decisive action and averted the crisis. Arminio Fraga has said that Brazil has been keeping ahead of the curve, rather than falling behind. They have been, though more decisive fiscal action would be useful. Another example is Israel in 1996, and this year: they could have been heading for a crisis with a very large current account deficit but took both fiscal and exchange rate action that has removed the risk of a crisis in the next few years. Third, there are crises that are expected but don't happen. I must confess that there are a couple of crises I've seen coming for two years that haven't happened yet, and I can't tell you what they are or why I expected them—and still expect some of them. In thinking about crises, we will need to figure out how and why the markets keep financing these countries, possibly long enough for them to avoid a crisis.

Should the Official Sector Speak Out?

We keep being asked whether we shouldn't go public with our concerns when we have them. The Thai case is interesting, in part because this crisis was foreseen. We warned Thai officials of the difficulties they were likely to face, starting in 1996, and with greater force in 1997.

They didn't accept our advice. Why? Because they had a weak government that was not capable of taking action short of a crisis. Possibly, also, they did not believe us. Perhaps we have a tendency to cry wolf more often than is essential. In any case, until the crisis happens, once you've sent more than one warning the recipient is always entitled to say, "Well, you told us two months ago that it would happen, and it hasn't."

Now, should we have spoken out? Well, we did, a bit, in two ways. First, I spoke to the Institute of International Finance, which is a bankers' association, in April 1997. They had just issued a very upbeat report on capital flows to developing countries. We were concerned about some countries, including Thailand, but didn't want to be too alarmist, so I included a statement to the effect that we really agreed with their overall favorable assessment, but we were sure that they had taken into account the special circumstances of countries that had particular problems, like very large current account deficits and weak financial systems, and left it at that. Since it was quite likely they would not pay a whole lot of attention, it's possible that all I was doing was salving my conscience rather than issuing a warning to those who were prepared to listen carefully. Perhaps if we are to issue warnings, we should do so clearly and loudly.

The second time we spoke out on Thailand was when we received requests

from some neighboring governments to persuade Thailand to get into an IMF program. In response we did speak out, saying in public that Thailand needed a stabilization program. We said it didn't have to be an IMF program, but the government did need to take action, because the economy was heading for trouble. We were told later that the statement had an impact on the debate inside the Thai government. That worked out as hoped, but it's clear we will not ever be comfortable doing this. This is an issue with which we will continue to wrestle, and perhaps, when the problem is exceptionally clear-cut, we will have to speak out again.

Exchange Rate Systems

We often announce that to prevent crises countries need to have sound macroeconomic policies and a sound financial system. What about the exchange rate system? We generally say that if you have good macroeconomic policies, you'll have a stable exchange rate. Really? Did Japan and the United States run unstable macroeconomic policies between 1995 and 1996? Is that why the exchange rate moved 50 percent in that period?

The position that exchange rates will be stable provided policies are virtuous is not well supported by the evidence. But we're not sure what system to recommend. I am skeptical about the notion of free-floating rates, particularly for developing countries, and believe that a country that is trying to develop through integration into the global economy makes the task that much more difficult if it does not seek in some way to stabilize the exchange rate. In an extreme storm, there are probably benefits to being able to let the rate move, but the rate still has to be defended.

No doubt there is more to be said; but it is surprising that there is still so much uncertainty about this essential issue.

Capital Controls

There are differences among types of capital control. In the first instance there is a need for prudential controls on the foreign exchange exposure of banks and possibly other institutions. We need more work to study the effectiveness of different types of prudential control and also to consider whether anything can or needs to be done to limit the exposures of nonfinancial corporations.

The capital inflows problem of a country that is trying to stabilize, needing high domestic interest rates, is a familiar and difficult one. Not many countries have dealt with it successfully. Chile has. Maybe the controls have nothing whatever to do with Chile's success, as some have argued, but that's a hard case to make. Chile's controls are market based, requiring a reserve deposit to be placed in the central bank. Such market-based measures are preferable to administrative controls with a large measure of discretion.

Let me also discuss the proposal to amend the Articles of Agreement of the IMF to make liberalization of capital flows a purpose of the IMF. At present we have as one of our purposes the promotion of current account convertibility, but not capital account convertibility—though we are allowed to require countries to impose capital controls in certain circumstances. The proposal to amend the articles in this direction has aroused a great deal of concern in many developing countries, though not, I believe, warranted concern. Capital account liberalization is something that in the long run is going to happen to almost every country, as current account liberalization has happened to almost every country. And in the long run, as financial structures strengthen, it will be a good thing. The purpose of this amendment is to bring some coherence to the process of capital account liberalization, allowing us and the profession to develop theories and best practices about how to go about it, to answer such questions as: Which controls should be removed first? Which—including prudential controls—are essential to keep until the very end, perhaps forever? Which controls are more efficient, which are less efficient? We have answers to these questions for the current account. We know that quotas are by and large worse than tariffs, despite the reverse occasionally being true in very specific circumstances. We know something about liberalizing by cutting tariffs proportionally, and so forth. We don't have similar answers on the capital account—and we should try to develop them.

We would have for the capital account, as we have for the current account, two statuses in the IMF. For the current account we have Article XIV and Article VIII status. If a country is in Article XIV status, it has restrictions on current account transactions that have been in place since it joined the IMF, and which should not have intensified; the country would generally be liberalizing these restrictions more or less gradually. Then, at some point when current account liberalization is complete, the country accepts the obligations of Article VIII, not to impose restrictions on the current account. Most IMF members used to be in Article XIV status. We now have 140 countries out of 192 that have accepted Article VIII. For the capital account, a process that is similar, gradual, and possibly quite slow would be likely if this amendment is accepted.

Multiple Equilibria and Contagion

In dealing with a crisis, one has to ask how anyone knows how far the exchange rate ought to move. At the start of the Mexican crisis, the Mexican government prepared a program that had a presumed current account deficit of about 3 percent of GDP and some budgetary contraction and a tightening of monetary policy. I don't think today that that program was inherently impossible, but it was impossible given the markets' complete loss of confidence in Mexico.

As an arithmetic matter, the initial Mexican program held together. Does

that mean the Mexican outcome was one of possible multiple equilibria? I'm not sure *ex post*. The reason I have great difficulty deciding this question is because of a saying of Milton Friedman's—that man may not be rational, but he's a great rationalizer. There is no situation that you cannot explain *ex post* as having been the only thing that could possibly have happened. We can now explain very convincingly why Mexico had to have a decline in GDP of 7 percent in 1995. If it had been 3 percent, we could explain that as well, and how they managed to get by with that with all the help they got from their friends, and the strong show of support by the international community, and the excellent progress and structural reform that had been made in earlier years, and the determination of the new president to continue it. You could write that scenario perfectly, and it would be just as persuasive as the description of what actually happened.

So I have great difficulty knowing how we know whether the market is doing right, whether there isn't another equilibrium, and what exactly is driving these situations. But if that's what you start believing, then you have to ask whether in a crisis or otherwise, countries shouldn't at least tentatively take a view on where the exchange rate should be. Of course, they can't in these circumstances use reserves extensively to defend a particular rate, but they may try to use the interest rate to keep the rate from moving too far.

Contagion

Contagion exists if, given the objective circumstances, a country is more likely to have a crisis if some other country is also having a crisis. The data show, for instance in a paper by Eichengreen, Rose, and Wyplosz (1996), that contagion exists, a result that is easy to believe given the European crisis, the Latin American crisis, and the Southeast Asian crisis.

Some of the contagion is understandable. Thailand's devaluation affected the equilibrium value of Indonesia's exchange rate, and so Indonesia's rate should have depreciated. But it is very hard to see why Indonesia's exchange rate was driven so far—this looks very much like an overreaction. The official sector, and those in the private sector who had examined the situation closely, believed that Indonesia's macroeconomic fundamentals were initially quite strong. If so, there was a strong case for official intervention. This takes us to the next point, namely: should the IMF be lending in these circumstances and does that create too much moral hazard?

Moral Hazard

Article I of the IMF's Articles of Agreement, which sets out the purposes of the Fund, includes the following: "To give confidence to members by making the general resources of the Fund temporarily available to them under appropriate safeguards, thus providing them with opportunity to correct maladjust-

ments in their balance of payments without resorting to measures destructive of national or international prosperity.” We were set up in part to lend to countries in crisis and are thus not going to tell a member that we cannot lend to it because of the moral hazard. Nonetheless, the issue is an important and difficult one.

There is moral hazard in every single insurance arrangement. We all know the analysis that seatbelts increase the speed at which people drive, and increase the intensity of accidents, and could even increase the number of accidents. Nonetheless, we have not decided to reduce the number of seatbelts, nor, as Lawrence Summers puts it, do we insert a dagger into the steering wheel, pointing upward, to make people drive more slowly. We accept that there are trade-offs among speed, the number of accidents, and the number of fatalities.

That is also the case with the moral hazard of lending by the official sector in circumstances in which a country is in severe trouble, and there seems to be nothing else that will help it avoid taking measures destructive of national prosperity, which means having a very, very deep recession. Mexico’s 1995 recession was very deep. It is hard to believe it would have been better for Mexico to have output decline by 12 percent instead of the 7 percent that actually took place—and the larger decline would have been quite possible had Mexico not received financial assistance. A similar argument applies in the Thai case.

But we do need to look for measures that will reduce this moral hazard, by finding ways of ensuring that the costs of dealing with a problem like this are shared by private sector lenders.

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4. William J. McDonough

I’d like to begin by applauding Paul Krugman’s paper, which is so catholic that I can applaud it without anybody being absolutely sure how I interpret it; and thus Krugman’s reputation is not endangered by being endorsed by the president of the Federal Reserve Bank of New York.

By far the best way of dealing with a foreign exchange crisis is not to have one. How does one avoid a foreign exchange crisis? A variety of things have been suggested and can be thought of, but one starts with good macroeconomic policy. Moreover, good macroeconomic policy has to be accompanied by labor market flexibility, so that the economy can respond to changes without high levels of unemployment. I think that this is increasingly important because it is not going to be possible for elected politicians to follow a sensible, stable macroeconomic policy with very high unemployment rates. Very high unemployment rates over a period of time affect a stable economy politically and socially and therefore have to spill over into economic policy.

A robust foreign exchange regime is required. There is no perfect foreign exchange regime. I prefer a floating rate regime for the same reason Churchill preferred democracy: it's less bad than any of the other systems. But a perfect floating exchange rate regime doesn't work perfectly well, and therefore, some modifications to it, especially to avoid an overvalued exchange rate, are appropriate.

It is very important for a country to develop two-way capital markets, both in equity and in debt and debt-related instruments. It is very helpful to have both a high level of foreign exchange reserves and the skill to use them. Using foreign exchange reserves skillfully is hardly a no-brainer. It takes some expertise in dealing in the markets, especially the expertise to make it clear to market participants that risk is two way, and that the central bank has the skill and the guts to intervene in a two-way market.

It's also very important to have a strong banking system because if the banking system is weak, it is virtually impossible for the monetary authorities to use the interest rate tool for any period of time to support a transitory, and fundamentally unjustified, weakness in the exchange rate.

We all know that, even with the best macroeconomic policy, things can go awry and the fundamentals can get out of whack, forcing adjustments in the existing exchange rate, exchange rate regime, or both. Making those adjustments takes courage. We like to think of Domingo Carvalho as resisting all the pressures against the Argentine peso, courageously standing up against the world markets and winning, and he deserves a great deal of praise; and those who supported him, especially a very well done IMF program, should share in that praise. But there are other times when it takes at least as much courage to say that change must take place. It is important that financial officials not get confused between attitude and intelligence in judgment.

If one is going to make a change, the descriptions that were made in Krugman's paper and in our discussions certainly suggest that there is plenty of time. Markets respond to fundamental disequilibria quite slowly. And who knows better than the authorities of the country that they really aren't going to make it?

The reason making changes takes courage is that, as the finance minister, with a term in office that will eventually end, you may have incentives not to

tough it out, to let your successor or the next administration worry about it. If one does that consciously, it is a serious disservice to one's country, and not something that should have our admiration.

Using that as a bit of background, I'd like to make a few comments based on my personal involvement in this decade's foreign exchange crises. Let's start with Europe in 1992. I think there are two interesting questions.

Why did the United Kingdom get attacked successfully, while France got attacked and held? What were the differences? I think there were three factors in the British case. First, they entered the ERM at the wrong exchange rate. We all know that, and certainly the British discovered that very quickly after doing it. They were operating with at least one, if not two, hands tied behind their back from day one. Second, the interest rate regime in Great Britain ties mortgage interest rates very closely to short-term interest rates. There is very little that one can imagine as sensitive to the electorate as their mortgage payments. Therefore, this peculiarity in the British financial system made the high interest rate tool unusable for any length of time.

Third, different from the French, British monetary authority officials are very pragmatic. So one could say that if it were perfectly clear they were going to get their brains beat out, they probably wouldn't be likely to continue their current course. On the other side of the English Channel we have the legend of Napoleon's imperial guard: the guard dies, it does not surrender—which was said at Waterloo, and then most of them got blown up to show their great courage. That is an attitude, but it's an attitude that's particularly prone to exploitation if you happen to enjoy the benefit of the entire postwar European history being based on the Franco-German connection. So market participants knew, however much the Bundesbank might detest having to do it, that they were going to back France all the way. They had no choice.

In addition to that, a result of the French characteristic of not being happy to surrender on any battlefield on any day is that a good many market participants normally regarded as being very tough were chatting with the French officials: If someone's attacking your currency, *ce n'est pas moi*. I'm your supporter, I'm in there. And the French authorities, if that reassuring phone call didn't come in, were sort of reminding people that they had very long memories and a dirigiste economy; they could make your life very unpleasant if you wanted to do business in France. That combination is a partial explanation of the difference in what happened in those two countries.

The tequila crisis certainly was a classic situation of the fundamentals getting out of whack, and quite obviously so. Then came the horrible political blows of the two assassinations in 1994. Though one could have argued, and certainly the Mexican officials did, that they were going to be able to tough it out, get into the new administration, and come up with a good macroeconomic policy that would work. It didn't. Probably the single biggest contributor was the political problem from the two assassinations, and there certainly were

some spillover effects into Mexico from the doubling of the Fed funds rate between February 1994 and February 1995.

Most of us, and all the officials on the American side, hoped, indeed thought, that the Mexican crisis could be confined to Mexico. We began our approach to the issue with that assumption. In the period between Christmas and New Year's, specifically on 27 December 1994, it became clear that it wasn't working. Contagion, a word used among economists but not much among market practitioners, was taking place. The key country telling us that was Argentina. Argentina was being hit, not because its fundamentals were that much like Mexico's, but rather because, I think, in very thin markets, emerging market fund managers were making the mistake of assuming that the little guy would get scared to death by Mexico and bail out.

As a matter of fact, the little guy didn't bail out, so one could argue that the emerging market fund managers created a problem that didn't need to happen. But at any rate it happened. What was our approach going to be? Our approach had to be that we couldn't solve all the problems cropping up around the world. The main thing to do was to get Mexico fixed as fast as possible. That lent itself to a massive response by the government of the United States and the International Monetary Fund.

You will recall that critics of both the Fund and the U.S. government, mainly from Europe, argued that if we saved the *malditos* Tesobono holders from the consequences of their own poor judgment, everybody everywhere would have to be bailed out in perpetuity. There was a good deal of validity to that argument. I cannot tell you how much effort went into thinking about how we could save Mexico and stick it to the Tesobono holders. Nobody could figure out how to do it. So the Tesobono holders got saved simply because that was a price we had to pay in order to achieve the greater good, which was to help Mexico and, hopefully, avoid the contagion effect. I think it worked reasonably well.

A very brief remark on Hong Kong. An interesting question is: why is Hong Kong holding up so well, even though its stock market has been hit hard? Except for some days, the exchange rate is holding up pretty well. What are some characteristics of Hong Kong that are making that happen?

Hong Kong's fundamentals are good, even if you can argue that the Hong Kong dollar is overvalued after the devaluations of its competitor currencies. If you look at the manufacturing area, most of the things counted as manufactured exports of Hong Kong aren't actually manufactured in Hong Kong. They're manufactured in South China. The front end, the design, and the back end, the marketing and selling, are done in Hong Kong. But the manufacturing, which is where the exchange rate effect would be important, is done in South China, where the exchange rate is just fine. Clearly, the exchange rate will hurt Hong Kong in the invisible areas and is hurting them on tourism. How long that will continue I'm not altogether sure.

Another very important characteristic of the Hong Kong economy is its very

robust banking system. And going back to some comments that Arminio Fraga and others have made about Mexico, how do you short the Hong Kong dollar? Even if you use derivatives, somebody in the chain has to be borrowing Hong Kong dollars in order to short the currency. If you're going to borrow a currency, you have to find somebody who has it. There are only three banks in Hong Kong that normally have large, long Hong Kong dollar positions: the Hong Kong Shanghai Bank, the Standard and Charter Bank, and the Bank of China. Do you think any of those three is going to get caught going short in Hong Kong? Not on your life. Therefore, the technical position of Hong Kong is really very powerful, even in these days of derivatives.

Now, once the crisis comes along, how does one manage it? I think, perhaps, and I can say it even more strongly than Stanley Fischer chose to, the IMF absolutely has to be the key player because conditionality must be imposed internationally. The amount of money needed to solve a crisis usually is not terribly large. The resources available to the IMF usually are large enough if the policy package accompanying the IMF program is good enough. Money isn't the problem. If you have the fundamentals fixed, the market begins to turn. The Fragas of this world are looking for a trend they can ride. You can get the market working with you; you don't need vast amounts of money.

What about conditionality? Why does the IMF have to do it? The United States has an immense amount of experience in its own hemisphere with the reasons it doesn't work for the sovereign government of a powerful country to be telling a smaller, weaker country what to do. It's almost impossible for the political leaders of that smaller country to allow the United States to tell them what to do. They don't want to bow, and be seen to bow, to their more powerful neighbor. Therefore, the IMF has to provide the conditionality.

Of course, critics of the government will say that the IMF and U.S. government are the same thing, but in the real world that's not so. Believe me, we have very little ability to tell the IMF how to manage its business. Stanley Fischer would say, "Hell, no," and Michel Camdessus would say something in French that would probably not be quotable.

One can argue that it works pretty well in Europe, doesn't it? With the European Union, everybody works together. I think the reason it works fairly well is that there is not a dominant power. Even though Germany is stronger, especially after unification, and a bit tougher and heavier than everybody else, it doesn't behave that way. And because of the very important Franco-German union, you don't have one power pushing everybody else around. It's much more a community decision. Therefore I think it works better.

In Asia, you have two candidates for the superpower of the area. It's almost certain that any borrowing countries where conditionality has to be tough, as it always has to be, are not going to take such conditionality easily. They would either decide that they didn't like it because the Japanese were behind it, or they didn't like it because China was trying to use this gimmick to take over Asia—which, they would immediately assert, China has been trying to do for

the past 2,000 years. I don't think it works but for different reasons than in the Western hemisphere, with the United States being as powerful as it is.

Discussion Summary

Paul Krugman noted that the economics profession is sharply divided about exchange rate regimes. One side heralds the use of currency boards and sees little benefit from floating exchange rates. The opposing side suggests that foreign exchange markets get prices right and should be followed without any fixing of rates. Krugman suggested that both views are wrong and that evidence suggests that no one size fits all. He also noted that while some dimensions of uncertainty have been incorporated into economic models, a fundamental uncertainty may exist about how agents believe the world works. This emphasis on worldviews may explain contagion. Disparate cases, such as the Mexican and Argentinian cases, are tied together by the common worldview of U.S.-trained economists in Latin America. Similarly, an Asian contagion may be explained by a crisis of confidence in the system of Asian values. In a related vein, this distinction between worldviews may explain the distinct outcomes for France and the United Kingdom in 1992. The French worldview couldn't imagine dropping out of the ERM while this was always a possibility for the United Kingdom.

Martin Feldstein suggested that, nonetheless, the French have paid an enormous price over the past fifteen years as a result of their adherence to the goal of monetary union. *Krugman* countered that they may not recognize it as such given their distinctive worldview.

William McDonough suggested that the cases of France in 1992 and Hong Kong now are related. In both cases, borrowing the underlying currency for shorting was extremely difficult given the dominance of a few banks. As such, these restrictions on access to credit amounted to informal capital controls. McDonough also stressed the importance of the support of the Bundesbank in its willingness to ease monetary policy to maintain the level of the franc in 1992.

Mervyn King expressed skepticism about the importance of the Bundesbank in determining the different outcomes for France and the United Kingdom in the European crisis. Instead, he suggested that Germany, France, and the United Kingdom had been at different stages in their business cycles and, consequently, had different thresholds for acceptable interest rates. The two striking outcomes of the European crisis, King noted, were that France was reattacked in 1993 and that the two countries who dropped out in 1992, the United Kingdom and Italy, have had considerable success since dropping out in meeting the Maastricht Treaty convergence criteria. In fact, King noted the irony

that the United Kingdom was closer than France or Germany to meeting the criteria with one notable exception—ERM membership—and had better unemployment performance.

Arminio Fraga commented that the centrality of Bundesbank policy was reflected by the importance of a speech by the Bundesbank president in the week prior to the crisis. According to Fraga, this speech was interpreted by speculators as providing a green light for moving against the pound. *Andrew Crockett* noted that the reference was expunged from the official record, and *King* suggested that the source was a wire service leak prior to the actual speech.

Sebastian Edwards suggested that the experience of Mexico after the crisis supports the use of floating exchange rates. Similarly, he suggested that Peru was another situation where a crisis may have been averted through the use of a semifloating exchange rate. While Peru may not be out of the woods, Edwards noted, its accomplishments over the past several years have been notable.

Francisco Gil Diaz also suggested that fixed exchange rates with bands tend to be inherently unstable, resulting in excess reserves or dramatic losses in reserves. As such, freely floating regimes have fewer discontinuities, recommending them over fixed regimes with bands. Gil Diaz suggested that the New Zealand and Canadian experiences serve to exemplify the virtues of cleanly floating regimes. *Robert Feenstra* added that the global sourcing procedures described by Carl Hahn may serve to reduce the sensitivity of firms to floating exchange rates. *Krugman* disagreed and suggested that sensitivity to floating exchange rates could also increase.

Stanley Fischer responded that in the Mexican case, there had been significant variability in the real exchange rate during the floating period. More generally, he suggested that the question is really whether monetary policy should react to changes in external accounts. Fischer argued that monetary policy must react to these changes and that looking only at domestic inflation is not a viable strategy. Indeed, the monetary conditions index used as a monetary policy indicator in both New Zealand and Canada attempts to capture external account conditions as an integral part of the monetary policy decision-making process.

McDonough noted that a recent report of the Bank of Mexico demonstrated a willingness to make monetary policy a flexible tool in response to external account conditions. This statement by an outgoing governor indicated the importance of taking difficult political positions in order to promote sound macroeconomic policy. In a related vein, he suggested that the prevailing practice in the United States, where only one person speaks about the level of the exchange rate and always says the same thing, is extremely valuable in providing a consistent message.

King inquired if Fischer thought that early warnings of crises by oversight agencies hold out the possibility of reduced social costs. *Kathryn Dominguez*

added that evidence from foreign exchange markets in the United States and Japan suggest that both speaking out and a credible threat of speaking out can play an influential role in markets. Given that the IMF has never spoken out, it would need to do so in order to establish this threat as credible. *Roberto Mendoza* noted that any release of private information in this context would represent a breach of confidentiality and severely affect the IMF's future access to such information. *Mendoza* and *David Mullins* noted that the reference to Thailand included in Fischer's speech was quite vague.

Fischer responded that while the comment regarding Thailand had been veiled, he considered it sufficiently clear. Moreover, Fischer cautioned that many potential crises do not happen and, accordingly, speaking out can precipitate or magnify social costs rather than alleviate them.

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