Fixing for Your Life

Guillermo A. Calvo, Carmen M. Reinhart

Brookings Trade Forum, 2000, pp. 1-38 (Article)

Published by Brookings Institution Press
DOI: https://doi.org/10.1353/btf.2000.0003

GUILLERMO A. CALVO
University of Maryland

CARMEN M. REINHART
University of Maryland

Fixing for Your Life

Nearly all the currency crises of the 1990s took place against a background of exchange rate regimes that have been characterized—after the fact—as soft pegs.[1] This has led many analysts to conclude that "the peg did it" and that emerging markets should "just say no" to fixed exchange rates. This advice seems paradoxical in light of the fact that most emerging markets have precarious access to international capital markets during the best of times (and none during the worst), and that access is often contingent on the stability of these nations' currencies.

This paper argues that in fact "floating" exchange rates are far from a panacea for emerging markets and that this policy advice misses a number of important real-world considerations that are crucial for developing countries. We present evidence that emerging economies are indeed very different from developed economies in several key respects that are bound to play an important role in the choice of exchange rate regime. In emerging market countries, devaluations—or large depreciations for that matter—are contractionary, and the adjustments in the current account are far more acute and abrupt. Currency crises become credit crises when sovereign credit ratings collapse following the collapse of the currency (as they often do), and access to international credit is lost. Lack of credibility also gives rise to a chronic and marked volatility in domestic interest rates. Furthermore, exchange rate volatility appears to be more damaging to trade, and the pass-through from exchange rate swings to inflation is far higher in emerging markets than in developed economies. These

The authors wish to thank Susan Collins, Ricardo Hausmann, Michael Kumhoff, Vincent Reinhart, Dani Rodrik and participants in *Brookings Trade Forum 2000* for helpful comments and suggestions and Ioannis Tokatlidis for superb research assistance.

1. At the time of the East Asian crisis, South Korea and Malaysia were self-classified as managed floats, Indonesia had an exchange rate band, and the Philippines' de jure label was "freely floating."

differences are significant and may help explain emerging market countries' historic and present reluctance to tolerate large fluctuations in their exchange rates.[2] In the context of a simple framework, we show why devaluations may be contractionary when there is no access to international credit and lead to "fear of floating" and procyclical policies.[3]

In the next section we present evidence on the fear of floating syndrome. We then review the empirical evidence of selected key indicators following currency crashes for emerging and developed economies, take stock of the empirical evidence on the effects of exchange rate volatility on trade for emerging markets, and present some evidence on the extent of pass-through from exchange rates to prices. At pages 22–28 we present an analytical framework that examines circumstances in which credibility loss translates into an inability to borrow from abroad and a devaluation can lead to a contraction in output. We also discuss other reasons for fearing large exchange rate movements, including the role played by liability dollarization and an ineffective lender of last resort. We conclude by examining the implications of this analysis for the choice of exchange rate arrangements in emerging markets.

Fear of Floating: Some Evidence

Despite the relatively recent increase in the ranks of countries classified as "floaters" or "managed floaters," nominal exchange rates in fact show little variation in most emerging markets.

In earlier work we examined the monthly behavior of exchange rates, international reserves, base money, and interest rates for a broad array of countries from 1970 to 1999.[4] In what follows, by contrast, we limit our attention to the time series properties of monthly percentage changes in the exchange rate,

2. See Hausmann, Panizza, and Stein (2000), for a discussion of these issues.

3. "Fear of floating" refers to the fact that countries with exchange rate regimes that are classified as flexible, more often than not, maintain their exchange rates within a narrow band with respect to some anchor currency—usually the U.S. dollar. More broadly, however, emerging markets display a chronic fear of large swings in their currencies, as evidenced by the lengths countries go to avoid a devaluation when their exchange rates are pegged.

4. These data are monthly and cover thirty-nine countries in Africa, Asia, Europe, and the Western Hemisphere during January 1970–April 1999. The countries are Argentina, Australia, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Côte d'Ivoire, Egypt, Estonia, France, Germany, Greece, India, Indonesia, Israel, Japan, Kenya, Korea, Lithuania, Malaysia, Mexico, New Zealand, Nigeria, Norway, Pakistan, Peru, the Philippines, Singapore, South Africa, Spain, Sweden, Thailand, Turkey, Uganda, Uruguay, the United States, and Venezuela. The sample covers 154 exchange rate arrangements. Calvo and Reinhart (2000b).

measured at the end of period.[5] Despite occasional bouts of foreign exchange market intervention—sometimes even coordinated intervention—the U.S. dollar floated about as freely against the deutsche mark and, more recently, the euro and the Japanese yen as any currency is allowed to float. For this reason, we compare countries with regimes that are classified as freely floating or managed floating against this G-3 benchmark.

We can glean actual policy practices by analyzing the frequency distributions of exchange rates around chosen intervals and comparing these across countries and regimes. The International Monetary Fund (IMF) groups countries into four types of exchange rate arrangements: pegged, limited flexibility, managed floating, and independently floating. Limited flexibility has been used almost exclusively to classify European countries (before the monetary union) with exchange rate arrangements defined in relation to one another (for example, the Snake or the Exchange Rate Mechanism [ERM]). Hence it is possible to evaluate the probability of a particular change or changes in the exchange rate, reserves, or similar factors on the basis of the announced exchange rate regime.

We denote the absolute value of the percent change in the exchange rate by ε. Letting x^c present some critical threshold, we can estimate the probability that ε falls within the prespecified bounds, conditional on a particular exchange rate arrangement.

For example, if x^c = / 1 percent / (that is, ε lies within a ± 1 percent band), then

$$P(\varepsilon < x^c \mid \text{Peg}) > P(\varepsilon < x^c \mid \text{Float}). \tag{1}$$

That is, the probability that the monthly exchange rate change falls within the 1 percent band is greatest for the fixed exchange regime and lowest for the freely floating arrangement, with the other two types of arrangements falling somewhere in between.Unless otherwise noted, the bilateral rates reported are with respect to the deutsche mark for the European countries, the choice owing to the fact that it was the most prominent reserve currency in Europe before the introduction of the euro, and, since Germany was the lowest-inflation country for many years, currencies in Europe were largely tied to the deutsche mark. For the remaining countries, the U.S. dollar is the usual anchor currency of

5. In an earlier paper, we analyzed international reserves, nominal and real interest rates, base money (nominal and real), prices, and a broad array of commodity prices that are relevant for a particular country. See Calvo and Reinhart (2000b).

Table 1. Exchange Rate Volatility in Recent or Current Floating Exchange Rate Regimes

		Probability that the monthly percent change in nominal exchange rate falls within:	
Country	*Period*	*± 1 percent band*	*± 2.5 percent band*
U.S. dollar/ deutsche mark	February 1973–April 1999	26.8	58.7
Japan	February 1973–April 1999	33.8	61.2
Australia	January 1984–April 1999	28.0	70.3
Bolivia	September 1985–December 1997	72.8	93.9
Canada	June 1970–April 1999	68.2	93.6
India	March 1993–April 1999	82.2	93.4
Kenya	October 1993–December 1997	50.0	72.2
Mexico	December 1994–April 1999	34.6	63.5
New Zealand	March 1985–April 1999	39.1	72.2
Nigeria	October 1986–March 1993	36.4	74.5
Norway	December 1992–December 1994	79.2	95.8
Peru	August 1990–April 1999	45.2	71.4
Philippines	January 1988–April 1999	60.7	74.9
South Africa	January 1983–April 1999	32.8	66.2
Spain	January 1984–May 1989	57.8	93.8
Sweden	November 1992–April 1999	35.1	75.5
Uganda	January 1992–April 1999	52.9	77.9
Average, excluding United States and Japan		51.67	79.27
Standard deviation, excluding United States and Japan		17.83	11.41

Source: Based on Calvo and Reinhart (2000b).

choice, since the largest share of emerging market countries' external debt is denominated in U.S. dollars, and world trade is predominantly dollar-invoiced.

Table 1 presents evidence of the frequency distribution of monthly exchange rate changes (in percent) for recent or current episodes that are classified as freely floating regimes. Our chosen threshold values are $x^c = |1 \text{ percent}|$ and $x^c = 2.5$ percent, which is a comparatively narrow band.[6] For the United States, for example, there is an approximately 59 percent probability that the monthly change in the dollar-deutsche mark exchange rate falls within a relatively narrow ± 2.5 band. For the dollar-yen exchange rate, that probability is slightly higher at 61 percent. By contrast, for Bolivia, Canada, and India (all declared

6. For instance, following the ERM crisis many European countries adopted (at least, in principle) ± 15 percent bands for the exchange rate. Similarly, until recently Chile had comparably wide bands. Other examples include Mexico before December 1994 (the country's exchange rate had an "ever-widening" band: the lower end [appreciation] of the band was fixed, and the upper ceiling [depreciation] was crawling) and Israel and Colombia from 1994 to 1998.

Table 2. Exchange Rate Volatility in Recent or Current Managed Floating Exchange Rate Regimes

		Probability that the monthly percent change in nominal exchange rate falls within:	
Country	*Period*	*± 1 percent band*	*± 2.5 percent band*
Bolivia	January 1998–April 1999	100.0	100.0
Brazil	July 1994–December 1998	83.1	94.3
Chile	October 1982–April 1999	45.5	83.8
Colombia	January 1979–April 1999	15.6	86.8
Egypt	February 1991–December 1998	95.7	98.9
Greece	January 1977–December 1997	58.6	85.3
India	February 1979–February 1993	53.6	84.5
Indonesia	November 1978–June 1997	96.4	99.1
Israel	December 1991–April 1999	45.5	90.9
Kenya	January 1998–April 1999	51.0	70.6
Korea	March 1980–October 1997	80.1	97.6
Malaysia	December 1992–September 1998	59.4	81.2
Mexico	January 1989–November 1994	64.3	95.7
Norway	January 1995–April 1999	56.9	90.2
Pakistan	January 1982–April 1999	77.8	92.8
Singapore	January 1988–April 1999	61.5	88.9
Turkey	January 1980–April 1999	12.6	36.8
Uruguay	January 1993–April 1999	22.7	92.0
Venezuela	April 1996–April 1999	60.6	93.9
Average		60.05	87.54
Standard deviation		25.43	14.28

Source: Based on Calvo and Reinhart (2000b).

floaters during that period), the probability is approximately 94 percent. An alternative way of stating the same facts is that there is only about a 5 percent probability in those countries that an exchange rate change will exceed 2.5 percent in any given month (versus a more than 40 percent chance for the dollar-deutsche mark exchange). On average, for the current set of independently floating exchange rate countries (excluding the United States and Japan), the probability that the exchange rate change will be contained in this moderate ± 2.5 percent band is more than 79 percent—significantly above that for the United States and Japan.[7] However, by this metric, postcrisis Mexico approximates a float more closely than any of the other countries—including Canada.[8]

7. The *t*-statistic for the difference-in-means test is 3.38, with a probability value of (0.00) under the null hypothesis of no difference.

8. The variance of the monthly changes in the Mexican peso-U.S. dollar exchange rate is about twice as large as the variance of the monthly changes in the yen-U.S. dollar exchange rate.

Moderate to large monthly fluctuations in the exchange rate are even rarer among the so-called managed float episodes (table 2). For Egypt and Bolivia, the probability of a monthly exchange rate change greater than 2.5 percent is nil; this was also the case for Indonesia and South Korea until the 1997–98 crisis. Even for self-proclaimed flexible-rate advocates, such as Chile and Singapore, the frequency distribution of their monthly exchange rate fluctuations relative to the U.S. dollar does not vaguely resemble those of the U.S. dollar-deutsche mark or U.S. dollar-yen, and a significantly higher proportion of observations falls within a narrow band; in the case of Singapore, there is an 89 percent probability that monthly exchange rate changes are within a 2.5 percent band, while for Chile that probability is only moderately lower. On average, there is an 88 percent probability that monthly changes in the exchange rate of managed floaters are confined to this narrow band. This exchange rate stability is surprising in light of the fact that inflation rates for many of the emerging market countries during these episodes were well above those observed for the United States; terms-of-trade shocks, moreover, were frequent and large.

Not surprisingly, the mean probability that exchange rate changes for limited flexibility arrangements are confined to this band is even greater: 92 percent (see table 3). Hence the observed behavior under the exchange rate regime accords with the assumptions stated in equation 1. What is most surprising is the narrowness of the wedge across regimes. Whereas the mean probability that the exchange rate is contained within a 2.5 percent band differs significantly when comparing the fixed exchange rate regime with the freely floating rate regime, other differences across regimes are less pronounced. For example, the average probability that $\varepsilon < 2.5$ percent for freely floating regimes is not significantly different from that for managed floating regimes, which, in turn, is not significantly different from the limited flexibility arrangement. There is, moreover, no statistically significant difference between the limited flexibility category and the pegged exchange rate.[9]

The results presented in our earlier work show that interest rate and reserve variability are significantly higher for most countries than they are for the G-3 countries, attesting to active policies to smooth exchange rate fluctuations, either by direct intervention in the foreign exchange market or by open market operations.[10] Our results suggest that even in many of the countries

9. For the freely floating-pegged exchange means test the probability value is (0.00); for the freely floating-managed floating means test it is (0.04); for the managed floating-limited flexibility means test the probability value is (0.32); and for the limited flexibility-pegged exchange means test it is (0.44).

10. See Calvo and Reinhart (2000b).

Table 3. Exchange Rate Volatility in Recent or Current Limited Flexibility Exchange Rate Regimes

		Probability that the monthly percent change in nominal exchange rate falls within:	
Country	*Period*	*± 1 percent band*	*± 2.5 percent band*
France	March 1979–April 1999	86.7	97.5
Greece	January 1998–April 1999	40.0	80.0
Malaysia	January 1986–February 1990	71.4	98.1
Spain	June 1989–April 1999	67.0	92.4
Sweden	June 1985–October 1992	58.1	92.1
Average		64.64	92.02
Standard deviation		17.23	7.27

Source: Based on Calvo and Reinhart (2000b).

that are classified as having a high degree of exchange rate flexibility, there is widespread fear of floating.

Emerging Markets Are Different: Some Stylized Facts

Several key differences between emerging market and developed economies may help explain why emerging market countries are often reluctant to allow their currencies to float freely and why policymakers in these countries may be particularly concerned about the consequences of large exchange rate swings. These include the loss of access to international capital markets, the contractionary effects of devaluations or depreciations, and the effects of chronic credibility problems. The adverse impact of exchange rate uncertainty on trade, as well as the problems that emerging market may face as a result of higher inflation pass-throughs may account for why exchange rate variability is so widely resisted.

The Sudden-Stop Problem

In this section we analyze different aspects of the aftermath of currency crises for developed and emerging markets separately, including what happens to growth, the current account, and to sovereign credit ratings. Our sample includes twenty-five countries, which are listed in table A-1; the data span the period 1970 through 1999, which includes 96 currency crisis episodes (the

dates of these crises are listed in table A-2.) Twenty-five of these crises are in developed economies, while the remainder are in emerging markets.

By using national income accounting data and abstracting from errors and omissions, net capital inflows equal the current account deficit plus accumulation of international reserves. Therefore, a sudden stop to capital inflows (that is, a drying up of access to world capital markets) has to be met by reserve losses or by a reduction in the current account deficit. In practice, both can take place. Whereas a loss of international reserves increases the country's financial vulnerability, a forced contraction in the current account deficit usually has serious effects on production and employment.

To visualize this, note that the current account deficit equals aggregate demand minus gross domestic product (GDP). Thus a sudden contraction in the current account deficit necessitates either a sharp decline in aggregate demand or, in the unlikely case, an offsetting increase in GDP. The decline in aggregate demand, in turn, forces a decline in the demand for both tradable and nontradable goods. The excess supply of tradables thus created can be shipped abroad, but the nontradables are, by definition, bottled up at home. Thus the price of nontradables relative to that of traded goods will have to fall (resulting in a real depreciation of the currency). A prominent example of the process is the real estate sector, where relative prices have exhibited sharp declines in all the crises of the 1990s. From here, what produces a loss of output and employment? Two channels can be identified: (1) the Keynesian channel, and (2) the Fisherian channel (identified, respectively, with John Maynard Keynes and Irving Fisher). The Keynesian channel is straightforward and familiar; it is predicated on the assumption that prices and wages are inflexible downward. Under these conditions, a fall in aggregate demand brings about a fall in output and employment.

The Fisherian channel, by contrast, is less familiar and, in our view, potentially more damaging. Financial contracts are as a general rule contingent on very few "states of nature," that is, objective variables, such as terms of trade, profit, or demand. A bank loan, for example, is typically serviced by a series of fixed installments unless the borrower goes bankrupt. To a first approximation and consistent with the Fisherian channel, loans are made at a fixed, predetermined interest rate that takes into account expected future variables, but they are not conditioned on their future realization. Consider a situation in which the exchange rate is fixed and the international price of tradables is exogenous and constant over time: A decline in aggregate demand that accompanies a sudden stop calls for a lower price of nontradable goods relative to

tradable goods. Because the price of tradables is stable, in order to achieve a lower relative price of nontradables, the *nominal* price of nontradables must fall. Thus, since the interest rate is invariant with respect to sudden stops, the ex post real interest rate faced by producers of nontradables surges, increasing the share of nonperforming loans.

Table 4 reports averages across the ninety-six currency crises in our sample of the current account deficit as a percent of GDP and the percent change in real GDP before and after the crisis year (T).[11] The fourth column reports the change, or adjustment, that took place between the year immediately preceding the crisis ($T-1$) and the year after the crisis ($T+1$). The crises episodes were aggregated by classifying the countries as either developed or emerging.

The general patterns in the current account deficit and economic growth are quite similar for emerging market and developed economies; in both groups, the currency crisis produces a reduction in both the current account deficit and growth. (For developed countries, however, the pre- and post-devaluation difference in growth is not significantly different from zero.) Hence, at least in this sample, devaluations in either group that accompany crises are expansionary, as suggested by most standard textbook models.[12] However, there are also important differences between emerging market and developed countries. The sudden-stop problem in emerging markets, as measured by the current account adjustment between $T-1$ and $T+1$, is almost five times as large as that for developed economies (about 3.5 percent versus 0.7 percent). Furthermore, the difference between the two groups is significant at standard confidence levels. As we show below, the larger adjustment in the current account may be the outcome of emerging markets' involuntary loss of access to international capital markets in the wake of currency crises.[13] Indeed, a simple analytical framework suggests that lack of credibility is likely to be at the heart of this key difference between emerging and developed markets

11. We define a currency crisis as in Kaminsky and Reinhart (1999), who construct an index of exchange market pressure that captures losses and depreciation; it is a weighted average of these two indicators with weights such that the two components have equal sample volatility. Because changes in the exchange rate enter with a positive weight and reserves enter with a negative weight, large positive readings of this index indicate speculative attacks. Readings of this index that are three standard deviations above its mean are classified as crises.

12. The textbook account emphasizes the influence of a change in relative prices in shifting the composition of a given level of aggregate demand. Both the Keynesian and Fisherian channels provide mechanisms to account for why total demand might fall.

13. Recall that $CA + KA + \Delta R \equiv 0$, where CA denotes the current account balance, KA is capital account balance, and ΔR denotes changes in reserves, and where a negative number indicates an accumulation of reserves by the monetary authority.

Table 4. Current Account Adjustments and GDP Growth before and after Currency Crises[a]

Country Group	*T-1 (1)*	*T (currency crisis year) (2)*	*T + 1 (3)*	*Change from T-1 to T+1 (4)*	*Change/ precrisis (4)/(1) (5)*
		Current account deficit as a percent of GDP			
Emerging markets	-4.46	-3.97	-1.39	3.47	-71.4
Developed countries	-2.84	-3.06	-2.10	0.74	-26.1
Difference	-1.62	-0.91	0.71	2.33**	…
		Percent change in real GDP			
Emerging markets	3.61	1.27	1.62	-1.99	-55.1
Developed countries	1.73	1.49	1.58	-0.15	-8.7
Difference	1.88**	-0.22	0.04	-1.84**	…

Sources: Authors' calculations using World Bank data.

a. A total of ninety-six currency crises, of which twenty-five are in developed economies and the remainder are in emerging markets.

** Significant at the 5 percent level.

and that this credibility problem may be so severe at times of stress that it results in an abrupt collapse in the country's ability to borrow in international capital markets. See below, pages 22–28.

In that light, it is not surprising that the magnitude of the recession following the currency crash is also significantly greater for emerging markets (see table 4). While the growth slowdown for developed economies is less than 0.2 percent (which is not statistically significant from 0), the recession is far more pronounced among emerging markets, with a reduction in growth of about 2 percent.[14] The difference in growth performance between the developed and emerging markets is also statistically significant; indeed, the last column, which shows the change relative to the precrisis performance, highlights more clearly the gap between the two categories. Furthermore, as shown in our earlier work, recessions appear to grown more severe during the 1990s.[15] Indeed, in the subset of crises in the 1990s there is an actual *contraction* in output—not just a sharp slowdown in growth.

One reason—perhaps a crucial one—for the deeper recessions and larger current account adjustments in emerging markets following currency crises is that these countries do not enjoy the international standing of their developed counterparts; hence emerging market countries may face substantial

14. For the contractionary consequences of devaluations in developing countries, see also Edwards (1986, 1989) and Morley (1992). Each of these studies focuses on devaluation episodes, even when they was not associated with crises.

15. See Calvo and Reinhart (2000b).

Table 5. Scale for Moody's Foreign Currency Debt Rating

Rating Scale	*Assigned Value*
Aaa	16
Aa1	15
Aa2	14
Aa3	13
A1	12
A2	11
A3	10
Baa1	9
Baa2	8
Baa3	7
Ba1	6
Ba2	5
Ba3	4
B1	3
B2	2
B3	1
C	0

Sources: Moody's Investors Service and the authors.

difficulties in obtaining external financing during the period following a devaluation or depreciation.

Loss of Access to International Capital Markets

One indication of how international credit markets view emerging markets can be gleaned by examining the evolution of sovereign credit ratings (in this instance those issued by Moody's Investor Services and *Institutional Investor* [*II*]) around episodes of financial crisis. The *II* sample begins in 1979 and runs through 1999. For the Moody's ratings, we have an unbalanced panel (that is, we do not have the same number of observations for all the countries).The currency crises examined, as before, are those listed in table A-1. For *II*, the ratings are an index that runs from 0 (least creditworthy) to 100 (most creditworthy). The *II* rankings are reported twice a year and are changed frequently. For Moody's, which uses letters to characterize a sovereign's creditworthiness, we map their letter ratings into sixteen possible categories, with zero corresponding to the lowest credit rating and sixteen corresponding to the highest (table 5).[16] The ratings may be changed at any time, hence we know in

16. This approach follows the procedure adopted in Cantor and Packer (1996a; 1996b).

Table 6. The Probability and Magnitude of Downgrades following Currency Crises: *Institutional Investor* Sovereign Credit Rankings, 1979–99

Country Group	*Probability of downgrade in six months (percent)*	*Probability of downgrade in twelve months (percent)*	*Probability of more than one downgrade in twelve months (percent)*
Emerging	39.0	79.3	31.7
Developed	38.4	73.1	30.8
Difference	0.6	6.2	0.9
		Index level	
	At crisis period	*Next six months*	*Twelve months later*
Emerging	37.6	36.0	33.5
Developed	76.0	74.9	74.5
Difference	-38.4**	-38.9**	-41.0**
	Magnitude of downgrade in six months (percent change)	*Magnitude of downgrade in next six months (percent change)*	*Magnitude of downgrade in twelve months (percent change)*
Emerging	4.3	6.9	10.8
Developed	1.4	0.5	1.9
Difference	2.8*	6.4**	8.9**

Source: Authors' calculations using data from *Institutional Investor*, 1979–99.
* Significant at the 10 percent level.
** Significant at the 5 percent level.

which month any changes took place. Moody's rating changes are far more infrequent than those of *II*.

Results from the analysis of the *II* and Moody's sovereign ratings are presented in tables 6 and 7, respectively. We report a variety of statistics in order to capture the various manifestations of the extent and the terms of access to international lending around currency crisis episodes. The statistics reported include the level of the assigned rating at the time of the crisis and at six and twelve months following the currency crisis, the probability of a downgrade for various time horizons following that event, and the probability of multiple downgrades. We also report the percentage change in the ratings at several time horizons. As before, we report the results for emerging and developed countries separately and test for differences among the two groups.

Turning to the *II* results first, as shown in the top panel of table 6, we find no significant differences between developed countries and emerging market countries in the probability of a downgrade (or multiple downgrades) following the currency crisis. However, this is where the similarities among the two coun-

Table 7. The Probability and Magnitude of Downgrades following Currency Crises: Moody's Sovereign Credit Rankings, 1979–99

Country Group	*Probability of downgrade in six months (percent)*	*Probability of downgrade in twelve months (percent)*	*Probability of more than one downgrade in twelve months (percent)*
Emerging	20.0	26.7	6.7
Developed	10.0	10.0	0.0
Difference	10.0**	16.7**	6.7*
	Index level		
	At crisis period	*Next six months*	*Twelve months later*
Emerging	4.9	4.5	4.3
Developed	15.0	14.9	14.9
Difference	-10.1**	-10.4**	-10.6**
	Magnitude of downgrade in six months (percent change)	*Magnitude of downgrade in next six months (percent change)*	*Magnitude of downgrade in twelve months (percent change)*
Emerging	8.2	4.4	12.2
Developed	0.7	0.0	0.7
Difference	7.5**	4.4**	11.5**

Source: Authors' calculations using data from Moody's Investors Service, 1979–99.
* Significant at the 10 percent level.
** Significant at the 5 percent level.

try groups end. It is worth noting that at the time of the crisis, the average rating for the emerging market countries is 37.6, slightly less than half the average score for developed countries (see table 6, middle panel). This, of course, suggests that even in the absence of a crisis, access to international lending is far from even for the two country groupings. Furthermore, that vast gap widens further in the aftermath of the devaluations associated with the currency crises. In the twelve months following the currency crisis, the magnitude of the downgrade is about five times greater for emerging market economies than it is for developed economies. On average, emerging markets' sovereign rating index falls 10.9 percent in the twelve months following the currency crisis. The differences between the postcrisis downgrade for emerging and developed economies is significant at standard confidence levels. The gulf between emerging market and developed economies is even greater when a comparable exercise is performed for the Moody's ratings. As with the *II* ratings, the level of the ratings at the outset of the currency crisis is significantly lower for emerging market economies—the sovereign rating level is about a third of

that assigned to developed economies. Furthermore, as in the *II* results, the magnitude of the downgrade in six months is far greater for emerging markets—about 9 percent versus less than 1 percent for developed countries. However, as shown in table 7, in the case of Moody's sovereign ratings, the probabilities of a downgrade in the twelve months following the crisis *and* of multiple downgrades is significantly higher for the emerging economies in our sample.

To complement the preceding analysis, we examine whether knowing that there was a currency crisis helps to predict sovereign credit rating downgrades for emerging and developed economies. In the case of the *II* ratings, for which there is a continuous time series, we regress the six-month change in the credit rating index on a currency crisis dummy variable, which takes on the value of one when there is a crisis and zero otherwise; the crisis dummy enters with a six-month lag.[17] The method of estimation is generalized least squares, correcting both for generalized forms of heteroskedasticity and for serial correlation in the residuals. In the case of the Moody's ratings, the dependent variable is three-month changes in the rating, while the explanatory variable is the crisis dummy three months earlier. The latter specification allows us to glean more precisely whether downgrades follow rapidly after crises take place. In the case of Moody's, the sovereign rating dependent variable is allowed to assume the value of –1, 0, or 1 depending on whether there was a downgrade, no change, or an upgrade. We estimate the parameters of interest with an ordered probit technique that allows us to correct for heteroskedastic disturbances.

The results of the estimation for both *II* and Moody's ratings are summarized in table 8. For developed countries, there is no conclusive evidence that ratings react to currency crises in a systematic and significant way. In the case of emerging markets, by contrast, currency crises help predict downgrades, irrespective of which rating index is used: the coefficients are significant at standard confidence levels—even though their marginal predictive contribution remains small. For example, in the case of Moody's, a currency crisis increases the likelihood of a downgrade by 5 percent. The difference between developed and emerging market economies in the reaction of sovereign ratings is not entirely surprising given the finding that slowdowns following currency crises are more severe in emerging markets. To the extent that the

17. It would be interesting to ascertain whether the rating change follows immediately after a crisis, but as the index is published only twice a year, it is not possible to make that determination from the *II* data.

Table 8. Reactive Credit Ratings: Developed and Emerging Markets

Dependent variable: *Institutional Investor* six-month changes in sovereign rating. Estimation method: Ordinary least squares with robust standard errors.

Independent variable is a currency crisis dummy	*Coefficient (1)*	*Standard error (2)*	*Probability value (3)*	R^2 *(4)*
Developed	-0.009	0.019	0.61	0.01
Emerging	-0.04**	0.014	0.005	0.07

Dependent variable: Moody's three-month changes in sovereign rating. Estimation method: Ordered probit.

Independent variable is a currency crisis dummy	*Coefficient (1)*	*Standard error (2)*	*Probability value (3)*	*Pseudo* R^2 *(4)*
Developed	-0.08	0.90	0.901	0.001
Emerging	-0.27**	0.14	0.048	0.04

Source: Authors' calculations, using data from *Institutional Investor* and Moody's Investors Service.
** Significant at the 5 percent level.

downturn in economic activity is perceived to increase the risk of difficulties in meeting debt obligations, credit ratings have tended to behave in a reactive manner.

These results are also in line with those of other authors, who find evidence of two-way causality between sovereign ratings and market spreads.[18] Hence not only do international capital markets react to changes in the ratings, but the ratings systematically react (with a lag) to market conditions, as reflected in the sovereign bond yield spreads.

Exchange Rate Volatility and Trade: Emerging Markets Are Different

The preceding analysis focused on the differences between emerging markets and developed countries during periods of market stress. In this section we turn our attention to differences that are always present—crisis or no crisis. Given the outwardly oriented growth strategy pursued by many emerging market countries and, more generally, the prominent role played by international trade, we revisit the literature that has examined the links between exchange rate uncertainty and trade. The aim of this exercise is not to provide an exhaustive review of this vast literature; rather, our focus is on what these studies reveal about the differences between emerging markets and developed economies.

18. See Larraín, Reisen, and von Maltzan (1997).

Table 9. Summary of the Empirical Literature on the Effects of Exchange Rate Variability on Trade with an Emphasis on Emerging Markets

Study	*Period and country coverage*	*Volatility/risk measure*	*Estimation method and approach*	*Key findings*
		Mixed sample of emerging and developed economies		
Brada and Mendez (1988)	Thirty countries, of which fourteen are emerging markets, 1973–77	Dummy variable was assigned to designate whether a country has a fixed or flexible exchange rate	Cross section	Mixed results. For emerging markets exchange rate uncertainty inhibits bilateral exports.
Frankel and Wei (1993)	Sixty-three countries, annual data for 1980, 1985, 1990	Standard deviation of the first difference of log of nominal and real exchange rate	Gravity model of bilateral trade. Cross section ordinary least squares and instrumental variables	Mixed results. Small negative significant effect in 1980; positive significant effect in 1990.
Savvides (1993)	Sixty-two developed and emerging economies, 1973–86	Attempts to separate expected and unexpected variability of the real exchange rate	Two-step procedure for cross-sectional exports	Only the unexpected variability measure has a negative and significant effect on export volumes; result is robust when the countries are disaggregated into developed and emerging market groups.

		Emerging economies only		
Arize, Osang, and Slottje (2000)	Thirteen emerging market countries, quarterly data, 1973–96: Ecuador, Indonesia, Korea, Malaysia, Malawi, Mauritius, Mexico, Morocco, Philippines, Sri Lanka, Taiwan, Thailand, and Tunisia	Moving standard deviation of real effective exchange rate volatility	Johansen's cointegrating VARs. Country-specific error correction models are estimated for exports	Increases in volatility of the real effective exchange rate exert a significant negative effect on exports in both short and long run in all thirteen countries.
Caballero and Corbo (1989)	Six emerging market countries: Chile, Colombia, Peru, Philippines, Thailand and Turkey	Real bilateral exchange rate variance	Koych-type model is used to estimate export demand equations	Strong, negative and significant effect of real exchange rate uncertainty on the exports of all the countries in the sample.
Coes (1981)	Brazil, 1957–74, annual data	Real exchange rate variability and also dummy for crawling peg period	Log-linear demand for Brazilian exports	Reduction in exchange rate uncertainty during the crawling peg period significantly increased exports.
Grobar (1993)	Ten emerging market countries, 1963–85: Argentina, Brazil, Colombia, Greece, Malaysia, Mexico, Philippines, South Africa, Thailand, and Yugoslavia	Four uncertainty indexes capturing different measure of real exchange rate volatility	Export supply by SITC category. Pooled time-series, cross-sectional data, fixed effects	Most export categories were adversely affected by exchange rate uncertainty.
Medhora (1990)	West African Monetary Union	Real exchange effective rate variance	Import demand equations	Found no evidence that exchange rate variability affected African imports.
Paredes (1989)	Brazil, Chile, and Peru	Various measures	Manufactured exports, log-linear specification for individual countries	Volatility has a significantly adverse effect on exports.

A large number of studies have attempted to examine the link between exchange rate uncertainty and trade with respect to industrialized countries. Some observers have found that real exchange rate volatility has adverse consequences for the imports of several developed economies.[19] Others have found little evidence of any systematic effects.[20] In general, the findings of this literature are quite mixed—at least as far as industrial countries are concerned. Although the body of work that examines the link between exchange rate volatility and trade is thinner with respect to emerging markets, most of the existing studies appear to find more consistent patterns in the data. In general, this literature (summarized in table 9) seems to point in the direction that exchange rate variability has deleterious effects on trade, either on emerging market exports or imports.[21] Taken together, these findings would seem to support those of Andrew Rose, who, using data for 186 countries over the 1970–90 period, finds that countries that share a common currency trade three times as much with each other as those that lack a common currency.[22]

The more conclusive evidence that trade is adversely affected by exchange rate volatility in emerging markets is not entirely surprising and may owe to several features of the emerging market countries themselves. First, as Ronald McKinnon (among others) has shown, the patterns of trade invoicing in emerging market countries are markedly different from those in industrial countries.[23] In explaining what he calls the East Asian dollar standard, McKinnon observes that nearly all trade with the United States—including East Asia's trade—is dollar denominated. About 98 percent of United States exports and nearly 90 percent of its imports are dollar invoiced. Furthermore, he notes, "on a worldwide basis, manufactured and brand name goods tend to be invoiced in the home currency of the exporting country even though primary commodities remain overwhelmingly dollar invoiced."[24] McKinnon's observation is particularly relevant for emerging market countries, even those that have little trade with the United States, since many of these countries' exports have a high primary commodity content. Indeed, the evidence presented in some studies on developed countries reveals that invoicing patterns matter in determining the effects of exchange rate volatility on exports.[25]

19. See, for example, Kenen and Rodrik (1986).

20. See, for example, Mann (1989).

21. Only one of the papers that focuses on emerging markets—Medhora (1990), which examines the imports of the West African Monetary Union—finds no link between exchange rate volatility and trade.

22. Rose (1999).

23. McKinnon (1979).

24. McKinnon (2000).

25. See Qian and Varangis (1994).

Although emerging markets may fear depreciations or devaluations, as the case may be, as well as exchange rate volatility, these countries also tend to fear (and as a consequence, to resist) the consequences of large real appreciations not only for the obvious reason that they erode international competitiveness but also because of concerns about Dutch disease–type problems.[26] Such concerns are especially commonplace when countries are attempting to diversify their export base.[27]

A second feature of emerging economies that may explain why real exchange rate volatility has a negative effect on trade is the incomplete nature of their capital markets. Exporters and importers in developed countries, where futures markets are relatively well developed, have the tools to hedge exchange rate risk. In emerging economies, futures markets are either illiquid or nonexistent; out of fear of large exchange rate swings, central banks may attempt to replicate the conditions for exporters and importers that capital markets provide in the developed world.

Inflation and Exchange Rate Pass-Through Issues

Another reason why emerging market countries may fear floating in general and devaluations or depreciations in particular may be traced to concerns about the effects of large currency swings on domestic inflation. This exchange rate pass-through issue merits attention, especially in the context of countries that have adopted or are thinking of adopting inflation targets.[28]

Estimates of exchange rate pass-through should be grounded on a well-defined, micro-founded model. However, in the absence of such a model (or models) for this hybrid group of countries we rely, as a first pass, on simple techniques that allow us to glean what the temporal relationship between exchange rate changes and inflation looks like.

For each exchange rate regime, we estimate a bivariate vector autoregressive (VAR) model in inflation and exchange rate changes. The number of regimes covered in this exercise totals forty-one and covers the cases shown in tables 1–3.[29] Although the exercise is a simple one, it has several appealing features. First, because our delineation of the sample for each case is dictated by the exchange rate arrangement, it is less likely to be subject to Lucas critique–type problems—to the extent that pass-through may depend on the type of exchange rate arrangement. Second, the VAR approach treats

26. Such problems exacerbate a country's dependence on a single primary commodity export.
27. See Reinhart and Wickham (1994).
28. See, for example, Mishkin and Savastano (2000).
29. For an alternative approach to this issue, see Hausmann, Panizza, and Stein (2000).

Table 10. A Summary of the Incidence and Magnitude of Exchange Rate Pass-Through[a]

Country group	*Proportion of cases where there was a statistically significant pass-through*
Emerging	0.43
Developed	0.13
	Average pass-through coefficient
Emerging	0.228
Developed	0.065
Difference	0.163**

Sources: Authors' calculations, using International Monetary Fund, *International Financial Statistics*.
a. Details of the country and period coverage are provided in tables A-3 to A-6.
** Significant at the 5 percent level or higher.

both variables as potentially endogenous. This is particularly important where emerging market countries are concerned, as tables A-3 to A-5 attest. In several instances, the relationship runs from inflation to exchange rates, as countries follow a purchasing power of parity rule.[30] Third, it allows the data to reveal the dynamic relationship between the two variables of interest, since the lag length for the VAR is selected on a case-by-case basis according to the Schwarz information criterion. This is particularly valuable when it comes to comparing high- and low-inflation countries; in the case of the former, the pass-through tends to be more immediate.

Table 10 summarizes the incidence and magnitude of exchange rate pass-through (the results are based on tables A-3 to A-6). Two features of the results are noteworthy. First, the percentage of cases in which the block-exogeneity tests indicate that the lagged exchange rate change has a statistically significant effect on inflation is 43 percent for emerging markets versus 13 percent for developed countries. Second, the average pass-through is about four times as large for emerging markets as it is for developed economies. Taken together, these results may also help explain emerging markets' intolerance to large exchange rate fluctuations—especially devaluations or depreciations.[31]

30. On this issue see Calvo, Reinhart, and Végh (1995).

31. Of course, although a high pass-through is undesirable from the vantage point of controlling inflation, it helps cushion the effects of a devaluation (or depreciation) when there is extensive liability dollarization—an issue that we examine below.

Table 11. Credibility Problems and Financial Volatility

Country Group	*Average Variance in Monthly interest rates*[a]
Emerging	758.19
Emerging excluding high inflation	80.15
Developed	16.78
Difference excluding high inflation	63.37**

Sources: IMF, *International Financial Statistics*, various central banks.
a. Calculations based on Calvo and Reinhart (2000b).
** Significant at the 5 percent level.

Emerging Markets: The Chronic Credibility Problem

Even in the absence of a crisis, emerging economies have precarious access to capital markets. This credibility problem is reflected in sovereign credit ratings that are vastly inferior to those that prevail for developed countries—even before a devaluation. This chronic lack of credibility also affects the magnitude and abruptness of the sudden-stop problem.

Interest rates are an intertemporal price and for that reason heavily influenced by expectations; high and volatile interest rates are indicators of lack of credibility. As shown in table 11, interest rates are about five times more volatile in emerging markets as in developed economies, and that gap widens even further if we include countries with a history of chronic inflation.[32] This gap between the low- and chronic inflation emerging market countries is hardly surprising. Many emerging economies have a weak revenue base and a rudimentary tax collection system, a combination that has driven many a country, particularly in Latin America, to use and abuse the inflation tax (Calvo dubs this problem the "political fiscal gap").[33] As firms and households take into account the possibility of being taxed in this manner, credibility problems are exacerbated and translate into high and volatile interest rates. This interest rate volatility may be the outcome of procyclical policies that are responding to unstable expectations.

The evidence of the preceding discussion suggests that emerging markets may have solid grounds for resisting and fearing devaluations and exchange rate variability. Not only are currency crises contractionary, but they are associated with large and significant changes in countries' ability to borrow from

32. The results are based on the episodes shown in tables 1–3. For country-specific details, see Calvo and Reinhart (2000b).

33. Calvo (1999a).

international sources. The marked and systematic declines in credit ratings for emerging market economies following currency crashes, in contrast to the relatively unscathed developed economies, suggest that the large adjustments in the current account—the sudden-stop problem—that we observe in the data may be largely owing to an abrupt and involuntary loss of access to international capital markets. If such is the dire outcome of a currency crisis for emerging market countries, one might expect to observe a generalized tendency among these economies to try to limit exchange rate fluctuations, at least when compared to the currency swings evident among the developed economies that allow their exchange rate to float freely.

Varieties of Fear of Floating

The widespread fear of large exchange rate swings is made understandable by the fact that devaluations (or depreciations) in emerging markets tend to be contractionary. For emerging economies, moreover, these appear to be accompanied by an erosion of credibility (as revealed by deteriorating credit ratings) that may be so severe as to result in a loss of access to international capital markets. In this section, we present an analytical framework that examines the link between lack of credibility and fear of floating (or, more generally, allowing the exchange rate to adjust); we also consider the more extreme case where the credibility loss translates into an inability to borrow from abroad and a contraction in output. Other reasons for fearing exchange rate swings, including the role played by liability dollarization and an ineffective lender of last resort, are also discussed.

Managing Monetary Policy

Despite their heterogeneity, emerging market countries tend to share a common characteristic: they appear to be reluctant to let their currencies fluctuate freely. This leads us to conjecture that there may be at least one common cause—lack of credibility. If credibility is not conferred, the monetary authority has no authority. Expectations will rule the day. These credibility problems may be manifested in multiple ways, including volatile interest rates and sovereign credit ratings. Furthermore, lack of credibility may give rise to liability dollarization and limit the central bank's ability to act as an effective lender of last resort, all of which feed the fear of exchange rate fluctuations.

We can use a simple version of a conventional monetary model to put more structure on the lack of credibility conjecture. Let us assume that the demand for money satisfies the following Cagan form:[34]

$$m_t - e_t = \alpha E_t(e_t - e_{t+1}), \alpha > 0, \tag{2}$$

where m and e are the logs of the money supply and the nominal exchange rate, and E_t is the mathematical expectations operator conditional on information available in period t (which includes money supply and exchange rate in period t). The interest–semi-elasticity parameter is denoted by α.

For simplicity, consider the case in which money supply in period 2 onward takes a constant value $\bar{m}$. Then one can show that in a rational expectations equilibrium we have

$$e_1 = \frac{m_1 + \alpha\overline{m}}{1+\alpha}. \tag{3}$$

Thus the exchange rate in period 1 (which we can identify with the *present*) is a weighted average of present and future money supply. Moreover, and by the same token, $e_t = \bar{m}$, for $t = 2, 3, \ldots$. On the other hand, assuming (again, for simplicity) perfect capital mobility and that the international interest rate equals zero, we have the nominal interest rate $i_t = e_{t+1} - e_t$ satisfying

$$i_1 = e_2 - e_1 = \frac{\overline{m} - m_1}{1+\alpha}. \tag{4}$$

Case 1. Permanent increase in present m. Suppose that the economy was at steady state (that is, money supply constant at $\bar{m}$ and it is shocked by an unanticipated once-and-for-all increase in the supply of money in period 1. By equations 3 and 4, the exchange rate suffers a permanent devaluation accompanied by *no* interest rate volatility.

Case 2. Permanent increase in future m. By equations 3 and 4, a permanent increase in future money supply $\bar{m}$ (keeping m_1 constant) results in an increase in both the current exchange rate and interest rate.

Under circumstances of poor credibility, a policymaker faced with currency devaluation, and who does not intend to increase future money supply, faces a serious dilemma: if money supply in period 1 is not adjusted upward, the ex

34. This section draws heavily from Calvo and Reinhart (2000b).

post *real* interest rate will increase, possibly generating difficulties in the real and financial sectors. On the other hand, if m_1 is jacked up to stabilize interest rates, credibility could be impaired and future expectations could become more unruly and arbitrary.[35]

To increase realism, let us assume that the central bank pays interest m on money, and that the demand for money satisfies

$$\tilde{m}_t - e_t = \alpha E_t(e_t - e_{t+1} + i_t^m), \alpha > 0, \tag{5}$$

where "~" on variable m is a reminder that it refers to interest-earning money. It can readily be verified that equations 3 and 4 are still valid for the present version, if one defines

$$m_t = \tilde{m}t - \alpha i_t^m. \tag{6}$$

Hence, under this interpretation, raising central bank–controlled interest rates would be equivalent to lowering money supply. In this context, the currency devaluation that would be caused by a positive shock on future money supply $\bar{m}$ could be partially or fully offset by raising central bank–controlled interest rates (recall equation 3), a typical policy followed in emerging markets when the exchange rate threatens to rise sharply. Interestingly, by equation 4, the associated fall in m_1 raises market interest rates even more than if the central banks had stayed put. So this analysis suggests that in practice emerging markets have exhibited a pro-interest-rate-volatility bias.

If policymakers were faced with the choice between stabilizing i or stabilizing e, then the decision would be clear: stabilize the exchange rate. Exchange rate stabilization provides the economy with a clear-cut nominal anchor, while stabilizing i does not. In general, policymakers will find it optimal to allow for some volatility in both variables, while always steering clear from perfect interest rate stability. Therefore, credibility problems may bias the outcome toward lower exchange rate and higher interest rate volatility, as borne out by the facts.

Before examining that scenario, we turn to the case in which lack of credibility is so intense that the country loses access to capital markets.

35. Moreover, as shown in Sargent and Wallace (1975) and Calvo (1983), interest rate targeting may leave the system without a nominal anchor, even in the case where credibility is not an issue.

The Role of Loss of Access to International Capital Markets

A loss of credibility so intense as to exclude access to capital markets approximates the serious capital market difficulties that emerging markets underwent during recent crises, especially during the Russian crisis of August 1998. Indeed, the evidence of more frequent and significantly more severe downgrades in sovereign credit ratings in the aftermath of devaluations for emerging market countries presented above suggests that this capital market problem is far more generalized than the examples provided by the recent crises in East Asia and Russia.[36]

Consider an economy with tradables and home goods but without physical capital. Let c and h denote the consumption of tradables and home goods, respectively. The instantaneous utility index is given by $u(c) + v(h)$, where u and v are increasing, strictly concave, and twice differentiable over the positive real line. The intertemporal utility function is time-separable and exhibits a positive rate of time preference r, which for convenience is set equal to the (constant) international interest rate. The output of tradables is exogenously given. In contrast, home-good prices are staggered, and the output of home goods is demand determined. Government rebates all income to the representative individual in a lump sum. Moreover, consumption is subject to a cash-in-advance constraint that takes the following form:

$$m_t^3 e_t c_t + h_t, \tag{7}$$

where m denotes real monetary balances in terms of home goods and e is the real exchange rate, that is, the ratio of the nominal exchange rate to the price of home goods (the international price of tradables is set equal to unity).[37]

We examine the impact of a once-and-for-all devaluation of the currency under two polar regimes: perfect capital mobility and no capital mobility. Recent devaluations in advanced economies have not impaired these countries' ability to borrow abroad. Sweden, for example, has even been able to externally finance domestic bank rescue packages. In contrast, devaluations in emerging markets have been accompanied by a serious interruption of external financing. Therefore, the analysis of the two polar cases will help us to better understand why devaluations in emerging markets are linked to output loss, while the opposite happened in developed economies.

36. For further evidence about the sizable credit cut in emerging markets during recent crises, see Calvo and Reinhart (2000a).

37. Thus the economy exhibits all the characteristics of the model in Calvo and Végh (1993), which permits us to pass over the technical discussion of cash-in-advance constraints.

Assume that the economy starts at a steady state and has zero foreign assets or liabilities. Let y denote the supply of tradables and, for simplicity, assume y constant over time. Thus, under the above assumptions, at the steady state we have $c = y$. Moreover, given the separability of the instantaneous utility index, and the equality between the subjective rate of discount and the international rate of interest, a once-and-for-all devaluation does not affect tradables' consumption. Hence $c = y$ after devaluation. Furthermore, the following static first-order condition is satisfied (interior solutions are assumed throughout):

$$\frac{u'(c_t)}{v'(h_t)} = e_t, \tag{8}$$

which is the familiar equality between marginal rate of substitution and relative price. Hence before and after devaluation the following condition holds under perfect capital.

$$\frac{u'(y)}{v'(h_t)} = e_t. \tag{9}$$

Therefore, since a devaluation entails an increase in e (recall that home-goods prices are sticky), on impact a devaluation is always expansionary (that is, it leads to a rise in h and, hence, in the output of home goods).[38]

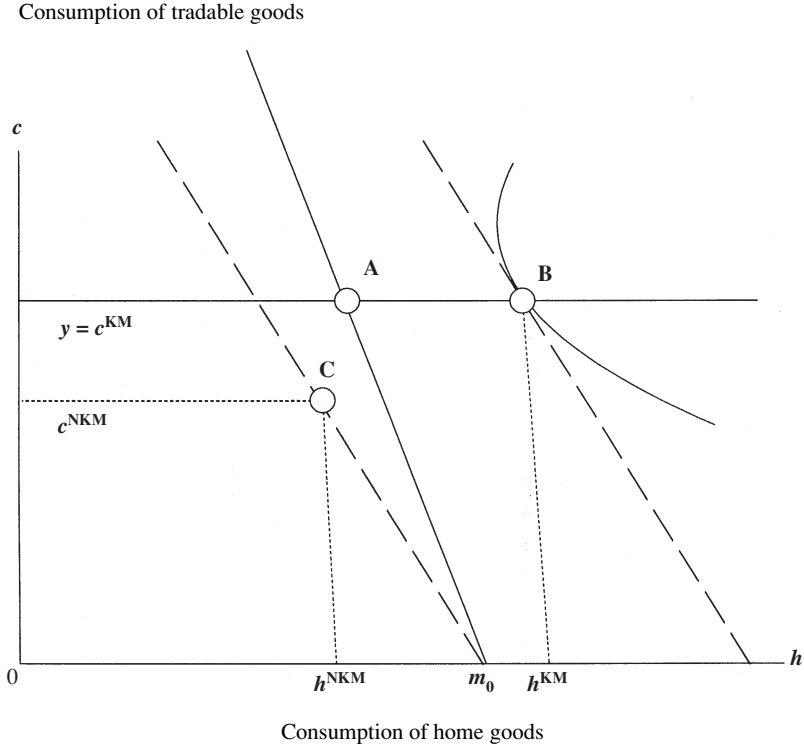
Consider now the case of no capital mobility. Under this condition, the stock of nominal money cannot be changed instantaneously. Thus, since home-goods prices are sticky, m is a predetermined variable. Moreover, with positive nominal interest rates (as in the present model), the cash-in-advance constraint is binding. Hence

$$m_0 = e_\infty y + h_\infty = e_0 c_0 + h_0, \tag{10}$$

where the subindex "∞" denotes steady state, and time $t = 0$ is, by definition, the point in time at which devaluation takes place. Figure 1 illustrates the determination of c and h at time $t = 0$ under the two regimes, where superscript *KM* and *NKM* refer to perfect capital mobility and no capital mobility, respectively. Point *A* corresponds to the steady state prior to devaluation, where the slope of the line passing through A corresponds to the real exchange rate prior to devaluation. After devaluation, relative prices are given by the slope of the dashed lines. With capital mobility, on impact the economy shifts to a point

38. Over time, e will return to its initial steady state, and hence initial expansion will vanish. This analysis will not be pursued because we focus solely on impact effects here.

Figure 1. Devaluation with and without Capital Mobility.



such as *B* and, as noted above, home-good output rises. Thus, given that tradables' consumption remains the same while their price goes up and that consumption of home goods rises, it follows from equation 2 that, on impact, real monetary balances have to increase and be larger than m_0. However, by condition 5, under no capital mobility, expenditure cannot exceed m_0. Hence the no-capital-mobility equilibrium, point *C*, is reached from point *B* as if the consumer in the standard textbook analysis had suffered a negative income effect. Consequently, if goods are normal (which holds under the present static separability assumption), consumption (and hence production) of home goods is larger with than without capital mobility. Therefore, *devaluation is more expansionary with than without capital mobility.* This is the central proposition. As a subsidiary result, note that if the income effect dominates the substitution effect, *devaluation with no capital mobility would be contractionary* (although, of course, it is always expansionary under perfect capital

mobility). This income-effect dominance condition is empirically plausible given that home goods largely comprise services, which are likely to be highly complementary with tradables.

Consequently, the analysis shows that losing access to capital markets when a country devalues tends to suppress the expansionary effects of devaluation. Moreover, if market access is not lost, devaluation is always expansionary. This analysis suggests the following explanation for why output in developed economies and emerging markets reacted so differently to speculative attack on their currencies. Devaluation in advanced countries came as a result of an attack on their currencies, but there is no evidence that their creditworthiness was put into question. By contrast, in all recent emerging market crises, the attack was first and foremost on bonds issued by the country in question, making debt rollover impossible or very difficult. Thus the key to the explanation may lie in loss of capital market access.

In terms of our central discussion in this section, the model gives a rationale for the reluctance of countries with poor access to capital markets to devalue in order to relieve balance-of-payments difficulties.[39] Moreover, Mexico's Tequila crisis suggests that a devaluation *may trigger* a loss of access to capital markets, especially if it is seen as breaking a policy commitment.[40] This is an additional motivation for emerging markets to exhibit devaluation aversion and thus generate a smoother exchange rate path.

Consequently, losing access to capital markets when a country devalues tends to suppress the expansionary effects of devaluation. Moreover, if market access is not lost, devaluation is always expansionary. This is at the root of why output in advanced economies and emerging markets reacted so differently to speculative attack on their currencies. Devaluation in developed countries came as a result of an attack on their currencies that did not put their creditworthiness into question. The key to the explanation may lie in loss of access to capital markets.

39. What happens as a result of currency *appreciations*? A mechanical extension of the above model shows that credit-constrained economies would suffer a smaller contraction. However, this extension is misleading because it implies that credit-constrained economies cannot *lend* abroad. If, instead, we assume that there are no constraints to lending, then we obtain the same contractionary effects from currency appreciation in constrained and unconstrained economies. An insight of this analysis is that in credit-constrained economies any exchange rate fluctuation is contractionary. Exchange rate volatility is harmful.

40. See Calvo and Mendoza (1996).

Ineffective Lender of Last Resort

A widespread view is that adoption of a currency board or dollarization significantly detracts from the central bank's ability to operate as a lender of last resort. This view is based on the conjecture that, since sums involved in bank bailouts are usually staggering, an effective lender of last resort should be able to issue its own money.

Typically, bank regulation allows banks to hold fractional reserves against deposits and imposes nonprohibitive costs on a maturity mismatch between assets and liabilities. As a result, banks' liabilities are more liquid than bank assets, which makes them liable to successful bank runs. One way to prevent self-fulfilling bank-run prophecies is for the central bank to step in and bail out the banking system if a run takes place. If expected by the public, the bailout may never have to be activated, thus making lender-of-last-resort capabilities costless to the central bank and beneficial to the private sector.

Douglas Diamond and Philip Dybvig, in a widely quoted paper, formalized self-fulfilling bank runs in terms of a *nonmonetary* model.[41] They give welfare grounds for the liquidity mismatch and show that, as a result, banks are liable to self-fulfilling runs. However, if the government announces that it will step in so that every depositor will come out whole, no bank run ever takes place. This operation captures the notion behind the existence of a lender of last resort. To make it credible, however, the government has to be able to raise enough taxes to finance the operation. Given the sums involved, this normally requires issuing government debt, which will eventually be serviced by higher taxes. However, this may not be possible for a country that has lost access to the capital market.[42]

Another drawback of the Diamond-Dybvig model is that it is a *real* model and, hence, cannot directly address the issue of whether a sovereign country's relinquishing the issuance of its own money could seriously impair the effectiveness of the lender of last resort. Suppose that deposits are denominated in domestic money, and that the central bank guarantees that depositors will be able to withdraw 100 percent of their deposits, if they so wish. A mechanical application of the Diamond-Dybvig model might suggest that this would be effective in preventing self-fulfilling bank runs. But this is wrong. In a mon-

41. Diamond and Dybvig (1983).

42. The Diamond-Dybvig model is a two-period model, and thus the issue of how to finance the bank bailout does not arise. Moreover, that paper does not discuss the critical issue of whether government is capable of raising the necessary additional taxes.

etary economy, the above guarantee does not ensure depositors that their deposits' *purchasing power* will remain intact.

Consider first the simple case in which bank-deposit interest rates are subject to a statutory ceiling (for example, the Federal Reserve's Regulation Q). Under those circumstances, if depositors expect a balance-of-payments crisis, there will be a bank run that the government will be unable to stop by the mere artifact of issuing money. Indeed, the act of issuing money will actually worsen the balance-of-payments crisis. This example is not very relevant in modern economies, because a large share of deposits earns interest (this will also be the equilibrium outcome of the Diamond-Dybvig model in a monetary economy). Under those circumstances, though, bank runs could cause balance-of-payments crises. First, depositors are unlikely to switch their deposits entirely into non-interest-bearing domestic cash. Instead, they are likely to try to hold alternative interest-earning assets (land, for example) or foreign exchange. As a result, if the central bank is unable to sterilize the extra bailout liquidity, the price level and exchange rate are bound to take a sharp upturn, unless the central bank has sufficient reserves to back up a large aggregate such as M2.[43] Consequently, if depositors expect a bank run, either depositors will withdraw their deposits—validating the run—or interest rates on bank deposits will have to become sharply higher.

If higher interest rates are successful in stopping bank runs, a lender of last resort would not be needed, because this operation could be undertaken by the banks without the help of the central bank. However, we cannot be very hopeful about the high-interest strategy: to compensate for a sharp price rise, interest rates may have to be so large that *if the run is stopped, banks will go bankrupt* (for fundamental reasons now). Banks will go under either because interest rates on their liabilities have risen substantially more than on their assets or, if that kind of interest-rate mismatch is avoided, because their loans have become nonperforming.

To keep depositors from fleeing the banking system, deposits can be indexed to prices (for example, UDIs in Chile) or exchange rates. The latter—"dollarization" of deposits—is a widespread practice in emerging market countries. Indexation provides an automatic mechanism to implicitly raise deposit interest rates when expectations of a bank run arise. Its advantage over deposits denominated in domestic currency is that the inflation or devaluation component of the interest rate is paid only if inflation or devaluation occurs. Thus

43. This should be ruled out in this example, however; otherwise the country would not be credit constrained.

banks' fundamentals are less likely to be undermined. This helps to explain, incidentally, why deposit indexation is so popular in emerging market countries. However, indexation increases the burden on the lender of last resort because deposits are now denominated in real terms. In fact, if all deposits are indexed to the exchange rate, for example, there would not be a major difference between this case and full dollarization.

How do advanced countries such as the United States manage to have an effective lender of last resort? The answer suggested above is simple: advanced countries never lose access to capital markets.[44] Was it critical for those countries to be able to print their own currencies? We doubt it.

In terms of the exchange rate volatility issue, this discussion shows that, contrary to popular belief, fixing the exchange rate may not entail a substantial loss of lender-of-last-resort capabilities in countries that are credit-constrained. Moreover, a limited lender of last resort gives rise to indexation of deposits. Aside from Chile, where UDIs have been a very successful vehicle for indexing debt to indexation to a domestic price level, and Brazil for a limited period, all other cases involve indexation to a hard currency (typically the U.S. dollar). This, in turn, induces banks (sometimes for regulatory reasons) to extend dollar loans. Given that domestic banks have a comparative advantage in lending to domestic residents, these loans will likely be channeled to them (and not recycled to the rest of the world).[45] However, not all domestic residents' earnings are denominated in dollars. In the services sector, for example, the dominant invoice currency is mostly domestic. Therefore, a devaluation may create serious financial problems in some sectors of the economy. This is an additional reason for the fear of floating.

Liability Dollarization

It could be argued that liability dollarization is partly a result of pegging, magnified by the overconfidence and moral hazard problems that pegging may foster. As the argument usually goes, if the exchange rate was free to float, domestic investors, especially those in the nontradables sector, would shy away from loans denominated in foreign currency. This is so because they will now face a larger currency risk than under a fixed regime. This sounds convincing, but it misses two important points: (1) most emerging markets start from a sit-

44. This may well change in the case of Japan if forecasters are correct in their projection of domestic public debt reaching 130 percent of GDP in the next several months!

45. Since the 1998 Russian crisis, however, banks in Latin America have exhibited a much diminished appetite for lending to the domestic private sector.

uation of partial dollarization (at the very least, liability dollarization), and (2) it is exceedingly difficult to find instances in which an emerging market country completely ignores exchange rate volatility. These points reinforce one another. Partial dollarization increases the cost of exchange rate volatility (through the Fisherian channel, for example), inducing the central bank to intervene in the foreign exchange markets to prevent fluctuations in the nominal exchange rate. In fact, as the cases of El Salvador, the Philippines, and Venezuela attest, this "fear of floating" may be so severe that the exchange rate spends long stretches of time at a fixed level, making it observationally equivalent to a soft peg.[46] This fear of floating induces more liability dollarization, creating a vicious circle from which it is very hard to exit.[47]

Fear of floating and the lack of the discipline that underlies fixed exchange rates may drive authorities to adopt additional control measures, such as dual exchange rates and controls on capital mobility. Even when fear of floating does not lead to capital controls and countries adopt "market-friendly" ways of stabilizing the exchange rate through open market operations, such policies have significant costs both in terms of the associated interest rate volatility and their procyclical nature. Thus, contrary to the view that floating provides authorities with an extra degree of freedom to guarantee a market-friendly environment, the opposite may happen.

Concluding Remarks

If the past is any guide to the future, promises and statements by countries to move in the direction of a floating exchange rate may be devoid of real consequences. There appears to be a widespread "fear of floating" that is closely linked with credibility problems.

The root causes of the marked reluctance by emerging market countries to allow for much fluctuation in their exchange rates are multiple. When circumstances are favorable (such as capital inflows or positive terms-of-trade shocks), many emerging market countries are reluctant to allow the nominal

46. This was also the case for Mexico during the years before the 1994 assassination of Luis Donaldo Colosio Murrieta, the presidential candidate of the Partido Revolucionario Institucional (PRI), despite an announced ever-widening band.

47. Fear of floating may arise as well when domestic firms use imported raw materials. In this case, floating is less destructive than in the previous example, but it can still cause financial difficulties over the medium term.

(and real) exchange rate to appreciate.[48] This probably stems from fears of loss of competitiveness and setbacks to export diversification. When circumstances are adverse, the case against allowing large depreciations (or a devaluation if the exchange rate is explicitly pegged) becomes even more compelling. The fear of a collapse in the exchange rate derives from pervasive liability dollarization, since in most emerging markets the debt of both the government and the private sector are largely denominated in hard foreign currency. Devaluations or depreciations may also result in the loss of access to international capital markets. For this and other reasons, devaluations or depreciations in developing countries have a history of being associated with recessions—not export-led booms. Our theoretical framework illustrates this point. Furthermore, financial regulatory authorities may resist large swings in the exchange rate because of the inflationary consequences of such changes and the credibility problems these may feed. Even in the best of times, exchange rate volatility appears to hinder trade, which is so essential to emerging market countries. We have shown that the pass-through from exchange rates to prices is higher for emerging markets. Similarly, our review of the literature on the consequences of exchange rate volatility on trade suggests that developing countries' trade appears to be more systematically impacted by exchange rate volatility.

If the fear of significant exchange rate swings continues to be the serious policy issue it has been in the past, and if, as the stylized facts suggest, emerging market countries remain dollarized both in terms of their debt and the invoicing of trade receipts and if their prices continue to be more predominantly linked to the fate of the exchange rate, it would appear that there is little solid basis on which to expect that emerging markets will "simply float." Indeed, as the dust settles following the Asian crisis and capital flows aggressively return to that region, we are seeing many of the old ways resurface—foreign exchange intervention rules the day and currency appreciations are actively resisted. Alas, it sounds a great deal like the early 1990s. Other countries, such as Brazil and Mexico, have embraced "inflation targeting." But in countries where the pass-through from exchange rates to prices is high, inflation targeting often starts to resemble a soft peg, as swings in the exchange rate are resisted.

Much of the glitter of "flexible" exchange rates disappears upon closer examination. The degrees of freedom provided by exchange rate flexibility

48. In the context of fixed exchange rates, revaluations are indeed rare.

are fallacious or can be substituted by fiscal policy. In reality, it appears that in emerging markets what prevails are varieties of soft pegs—despite their poor track record—which raises the issue of dollarization: Why bother having a national currency in the first place?

One point to remember in the debate over whether dollarization is appropriate for emerging markets is that these economies are still "emerging." They are setting policy in a world in which their own financial markets remain underdeveloped, their trade is invoiced predominantly in dollars, their corporate and financial institutions have a limited ability to hedge exchange rate risk, and their governments, more often than not, lack credibility. Exchange rate movements are costly in this environment. If policymakers take a hard look at the options for exchange rate regimes in emerging economies, they may find that floating regimes may be an illusion and that fixed rates—particularly, full dollarization—might emerge as a sensible choice for some countries, especially in Latin America or in the transition economies in the periphery of Europe and Asia.

APPENDIX

Table A-1. Country Coverage, January 1970–December 1999

Africa		
South Africa		
Asia		
Indonesia	South Korea	Malaysia
Philippines	Thailand	
Europe and the Middle East		
Czech Republic	Denmark	Egypt
Finland	Greece	Israel
Norway	Spain	Sweden
Turkey		
Latin America		
Argentina	Bolivia	Brazil
Chile	Colombia	Mexico
Peru	Uruguay	Venezuela

Table A-2. Currency Crisis Dates

Country	*Month and year*
Argentina	June 1975, February 1981*, July 1982, September 1986*, April 1989, February 1990
Bolivia	November 1982, November 1983, September 1985
Brazil	February 1983, November 1986*, July 1989, November 1990, October 1991, January 1999
Chile	December 1971, August 1972, October 1973, December 1974, January 1976, August 1982*, September 1984
Colombia	March 1983*, February 1985*, August 1998*
Czech Republic	May 1997
Denmark	May 1971, June 1973, November 1979, August 1993
Egypt	January 1979, August 1989, June 1990
Finland	June 1973, October 1982, November 1991*, September 1992*
Greece	May 1976, November 1980, July 1984,
Indonesia	November 1978, April 1983, September 1986, August 1997
Israel	November 1974, November 1977, October 1983*, July 1984
Malaysia	July 1975, August 1997*
Mexico	September 1976, February 1982*, December 1982*, December 1994*
Norway	June 1973, February 1978, May 1986*, December 1992
Peru	June 1976, October 1987
Philippines	February 1970, October 1983*, June 1984, July 1997*
South Africa	September 1975, July 1981, July 1984, May 1996
South Korea	June 1971, December 1974, January 1980, October 1997
Spain	February 1976, July 1977*, December 1982, February 1986, September 1992, May 1993
Sweden	August 1977, September 1981, October 1982, November 1992*
Thailand	November 1978*, July 1981, November 1984, July 1997*
Turkey	August 1970, January 1980, March 1994*
Uruguay	December 1971*, October 1982*
Venezuela	February 1984, December 1986, March 1989, May 1994*, December 1995

* designates episodes of twin crises

Table A-3. Significance Levels for Block Exogeneity Tests: Inflation and Exchange Rate Changes in Floating Exchange Rate Regimes

	Exchange rate equation		*Inflation equation*	
Country	ε	*t statistic*	ε	*t statistic*
U.S. dollar/yen	0.703	0.574	0.906	0.000*
Japan	0.294	0.889	0.313	0.000
Australia	0.389	0.158	0.045	0.000
Bolivia	0.000	0.459	0.000	0.015
Canada	0.024*	0.065*	0.246	0.000
India	0.151	0.342	0.723	0.000
Indonesia	0.786	0.743	0.000	0.000
Mexico	0.880	0.967	0.000	0.000
New Zealand	0.048	0.009	0.001	0.000
Nigeria	0.475	0.797	0.741	0.003*
Norway	0.027	0.319	0.153	0.297
Peru	0.004	0.000	0.000	0.000
Philippines	0.237	0.829	0.267	0.000
South Africa	0.013	0.004	0.059	0.000
South Korea	0.329	0.268	0.000*	0.795
Spain	0.219	0.788	0.792	0.916
Sweden	0.167	0.490	0.592	0.703
Thailand	0.335	0.924	0.668	0.281
Uganda	0.539	0.046	0.022	0.000
Venezuela	0.861	0.956	0.560	0.000*

* Significant at the 10 percent level or higher.

Table A-4. Significance Levels for Block Exogeneity Tests: Inflation and Exchange Rate Changes, Managed Floating Exchange Rate Regimes

	Exchange rate equation		*Inflation equation*	
Country	ε	*t statistic*	ε	*t statistic*
Bolivia	0.487	0.814	0.091*	0.942
Brazil	0.275	0.297	0.279	0.000
Chile	0.918	0.000	0.849	0.000
Colombia	0.000	0.240	0.739	0.000
Egypt	0.025	0.004	0.575	0.303
Greece	0.673	0.343	0.214	0.000
India	0.398	0.081*	0.557	0.000*
Indonesia	0.999	0.100*	0.403	0.000*
Israel	0.833	0.269	0.315	0.000
Kenya	0.706	0.904	0.764	0.962
Malaysia	0.524	0.269	0.050*	0.141
Mexico	0.358	0.419	0.702	0.000
Norway	0.746	0.426	0.526	0.951
Pakistan	0.907	0.278	0.905	0.002
Singapore	0.084	0.045	0.138	0.040
South Korea	0.000*	0.851	0.000	0.000
Turkey	0.135	0.298	0.000	0.000
Uruguay	0.691	0.010*	0.021	0.000
Venezuela	0.264	0.055*	0.000	0.000

* Significant at the 10 percent level or higher.

Table A-5. Significance Levels for Block Exogeneity Tests: Inflation and Exchange Rate Changes, Limited Flexibility Exchange Rate Regimes

	Exchange rate equation		*Inflation equation*	
Country	ε	*t statistic*	ε	*t statistic*
France	0.042	0.605	0.297	0.000
Germany	0.587	0.275	0.390	0.000
Greece	0.724	0.476	0.111	0.827
Malaysia	0.899	0.085	0.123	0.688
Spain	0.036	0.139	0.173	0.000
Sweden	0.589	0.708	0.521	0.509

Table A-6. Exchange Rate Pass-Through Coefficients[a]

Country	*Exchange Rate Arrangement and Dates*	*Coefficient of inflation equation*
Emerging Markets		
Bolivia	Float, September 1985–December 1997	0.474
Bolivia	Managed float, January 1998–November 1999	1.001
Indonesia	Float, August 1997–November 1999	0.062
Malaysia	Managed float, December 1992–August 1998	0.02
Mexico	Float, January 1995–November 1999	0.076
Peru	Float, August 1990–November 1999	0.149
South Africa	Float, January 1989–November 1999	0.098
South Korea	Managed float, March 1980–November 1997	0.014
South Korea	Float, December 1997–November 1999	0.085
Turkey	Managed float, January 1980–November 1999	0.256
Uganda	Float, January 1992–November 1999	0.147
Uruguay	Managed float, January 1993–November 1999	0.468
Venezuela	Managed float, April 1996–November 1999	0.114
Average		0.228
Standard deviation		0.276
Developed Economies		
Australia	Float, January 1984–November 1999	0.059
New Zealand	March 1985–November 1999	0.071
Average		0.065
Standard deviation		0.008

a. This table reports only coefficients for those cases where the estimated pass-through was statistically significant at the 10 percent level (or higher).

Comments and Discussion

Nouriel Roubini: This is an interesting, thought-provoking, and important paper on why emerging market economies may have reason to view floating exchange rates with concern—what the authors memorably term a "fear of floating."

In evaluating the authors' findings, it is noteworthy that the currency and financial crises of the 1990s have been crises of soft-peg (or intermediate exchange rate) regimes: the European Rate Mechanism in 1992–93, Mexico in 1994–95, East Asia in 1997–98, Russia in 1998, and Brazil in 1999.

The crises of the 1990s point to several conclusions about fixed rate regimes in emerging market economies:

—Fixed rate regimes are fragile when such regimes are not consistent with economic fundamentals and with monetary and fiscal policies.

—They do not necessarily provide monetary or fiscal discipline.

—They may lead to currency overvaluation, which widens current account imbalances and eventually leads to currency collapses.

—There are often real national or idiosyncratic shocks that require exchange rate flexibility.

—In the absence of two-sided exchange rate risk hedging, they may lead to the buildup of short-term foreign currency borrowing (as in Asia). This makes countries vulnerable to liquidity shocks and balance sheet shocks. Two-sided exchange rate risk instead gives incentives to hedge.

—Finally, fixed rates may lead to moral hazard, that is, excessive foreign currency borrowing with the expectation of a bailout in the event of substantial loss.

Citing the same evidence, however, many observers suggest that intermediate exchange rate regimes are neither feasible nor desirable and recommend

that emerging economies adopt so-called corner solutions: independently floating exchange rates or fixed exchange rates (in the form of currency boards or currency pegs). Critics of the growing consensus for corner solutions cluster around two arguments: one school of thought holds that intermediate regimes, in the form of managed floats or crawling pegs or bands, are viable solutions: their position is that "no single exchange rate regime is right for all countries or at all times."[1] Others argue that the flexible exchange rate corner is not a realistic solution for emerging economies and suggest that such economies establish currency boards or even abandon their national currency and adopt the dollar or another strong currency ("dollarization").[2]

Being in favor of the flexible exchange rate corner, however, is not necessarily an argument for a pure float. The United States intervenes in foreign exchange markets from time to time, although much less frequently than Japan and the European Union. Indeed, there are good reasons why emerging economies may be concerned about excessive exchange rate volatility. Occasional intervention or policies that target domestic interest rates may be necessary in order to smooth excessive exchange rate movements. This view is fully consistent with supporting "dirty floats." Nonetheless, there is substantial difference between soft- or semi-pegs and a dirty float, which is less subject to abrupt changes in the value of the domestic currency since monetary authorities, while trying to smooth excessive movements in exchange rates, will not try to prevent changes in exchange rate trends.

During the last several years, many emerging economies have moved away from pegs, soft-pegs, and crawls to regimes of greater exchange rate flexibility, essentially regimes of "dirty floats," including Mexico (December 1994), South Africa (March 1995), Thailand (July 1997), Indonesia (August 1997), South Korea (December 1997), Brazil (January 1999), Israel (1999), Chile (September 1999), Colombia (September 1999), and Poland (April 2000). Although as yet there are no systematic, country-specific studies of dirty floats, a good number of national monetary authorities have found that such regimes have in fact been performing quite well. These regimes have provided flexibility to monetary authorities even if, given the international financial turmoil of the last few years, interest rate tightening was required at times to signal policy credibility and avoid excessive exchange rate movements.

1. See, for example, Frankel (1999); Larrain and Velasco (1999); and Williamson (1995 and 1996).

2. See, for example, Calvo (1999b); Hausmann, Panizza, and Stein (2000); and Reinhart (2000).

The flexibility of exchange rates has helped in this regard, for the exchange rate becomes a partial absorber of external shocks. Given shocks to international interest rates, or access to international capital markets, or to terms of trade, the adjustment in these countries has occurred partly through higher interest rates and partly through a weaker currency. Thus exchange rate flexibility has helped to adjust to and absorb external shocks. Regardless of the exchange rate regime, however, emerging market countries need to maintain sound economic policies to protect themselves from financial crises.

Many of the results that Guillermo Calvo and Carmen Reinhart present in their paper represent an indictment of soft pegs that eventually collapse rather than a critique of exchange rate flexibility. Indeed, there is a vast difference between a fixed exchange rate regime that is not sustainable (that is, one that collapses through a sharp and discrete devaluation), leading to a currency or financial crisis, and a flexible exchange rate regime in which external shocks lead to changes in the equilibrium exchange rate in real time. Many of the effects found in this paper apply to fixed regimes that have collapsed, resulting in the severe consequences found by the authors.

Let us consider the authors' findings individually.

1. Devaluations are contractionary in emerging economies

The finding may well be true, but it implies that emerging economies may be better off with flexible exchange rate regimes than with unsustainable fixed rate regimes. A devaluation is not necessarily contractionary if it leads to an "expansionary" real depreciation. The main reason for a contraction is a balance-sheet channel: when a large stock of unhedged liabilities is denominated in foreign currency, a devaluation may be contractionary. Many observers have suggested that, historically, fixed rate regimes (where there was no two-sided exchange rate risk) have led to excessive unhedged borrowing in foreign currency by governments, financial firms, and corporations by distorting borrowing choices and leading to an excessive accumulation of foreign currency debt. Thus fixed rate regimes may pose moral hazard, because the guarantee of a peg distorts borrowing decisions by the private and public sector.

Flexible exchange rates, by contrast, provide two-way exchange rate risk and force borrowers to hedge more or to assume less foreign currency debt (or both). Under flexible exchange rate regimes, adjustments to internal or external shocks are smoother, more continuous, and less discrete than they are under pegs: sharp economic contractions, such as those associated with an

abrupt fall in the currency when a peg collapses, are less likely to occur under a flexible regime.

Thus exchange rate movements under a dirty float should not have the same disruptive balance-sheet effects that they do under fixed rates: they should be less contractionary. Indeed, currency depreciation may enable economies to adjust to external disruptions (such as terms of trade shocks) and can have an expansionary effect.

2. The adjustments in the current account following devaluations are far more acute and abrupt in emerging market economies than they are in advanced economies.

This result may be true but is again partly due to the consequences of unsustainable soft pegs. Over time, such pegs may lead to real appreciation, a loss of competitiveness, and an increase in the current account deficit, leading, in turn, to excessive accumulation of short-term foreign currency debt. The ensuing collapse of the currency is often associated with financial distress, a sudden cutoff of access to international capital markets, and a painful need to restore the balance of trade by forcing a contraction in domestic demand, sharply reducing imports, and restoring competitiveness by means of large real depreciation.

Pure floats or dirty floats can help to attenuate these effects in various ways: they may prevent in the first place excessive real appreciation and unsustainable current account deficits; the smoother adjustment of nominal exchange rates, moreover, does not lead to the financial distress associated with abrupt changes in currency values and the ensuing cutoff of access to international capital markets.

3. Credibility and market access, as captured in the behavior of credit ratings following devaluations, are adversely affected by devaluations.

This result, again, suggests the dangers of soft pegs. Devaluations that follow unsustainable pegs, overvaluation, large external imbalances, and buildups of foreign currency debt lead to currency crises and financial crises. The ensuing loss of market access and sharp downgrade in credit rating is a direct result of having an unsustainable exchange rate regime. Conversely, sound economic policies and flexible exchange rates may reduce the risk of a sudden cutoff of access to international capital market that follows a sharp currency devaluation.

4. Lack of credibility gives rise to marked volatility in domestic interest rates; monetary and fiscal policies are procyclical.

External shocks (such as abrupt changes in global interest rates, sudden reductions of access to international capital markets, or terms-of-trade shocks) will generally be contractionary and lead to procyclical policy in emerging markets: they reduce economic activity and force national monetary authorities to raise interest rates in order to signal credibility and avoid excessive capital outflows and excessive currency depreciation. This does not imply, however, that a dirty float exchange rate regime will fare worse following such shocks than will a fixed exchange rate regime. To the contrary, although several countries with floating exchange rates were forced to raise interest rates during the 1997–99 crises, countries with fixed exchange rate regimes (even institutionally fixed regimes such as currency boards) were forced to do the same. Interest rate hikes and increases in country spreads were as high in Argentina and Hong Kong during the global crisis as they were for floaters.

The contractionary effects of interest rate tightening following external shocks, moreover, were of a higher magnitude in countries with fixed rate regimes than in countries with floating exchange rates. Compare what happened to output in Hong Kong with what happened in Taiwan and Singapore (which had similar fundamentals but allowed their currencies to depreciate), or Argentina's policy with that of Mexico, Brazil, Chile, and Peru. Fixed exchange rates do not shelter economies from external financial shocks or from contagion.

Finally, although monetary policy among floating exchange rate economies during the 1997–99 crises was constrained by the need to show credibility following external shocks, monetary authorities used exchange rate flexibility to allow their currencies to depreciate and thus reduced the negative effects of external shocks on aggregate demand. The fact that output fell less for the floaters in Asia and Latin America than for countries with rigid pegs, such as Hong Kong and Argentina, has partly to do with exchange rate flexibility. While monetary policy may be partly procyclical following negative supply external shocks (it is usually so even in industrial countries in the presence of stagflationary shocks such as the 1973 and 1979 oil crises), this does not rule out countercyclical monetary policy. Shocks to aggregate demand and even to terms of trade can be partly absorbed through a currency depreciation.

In this respect, the experience of small OECD open economies is telling. Floating exchange rate economies such as Australia, Canada, New Zealand,

Sweden, and the United Kingdom have monetary policy autonomy and have adjusted to external terms-of-trade and demand shocks by allowing their currencies to depreciate. Australia avoided the Asian crisis and sustained 4 percent economic growth in 1998 by allowing its currency to fall in the wake of Asian export demand shocks and the shock to its terms of trade (primary commodities).

The counterargument that OECD countries are different from emerging economies because they do not suffer from a lack of policy credibility that rules out borrowing in domestic currency—the "original sin"— is only partly valid. Original sin does not condemn a country to hell for eternity. Sustained sound macroeconomic and structural policies may eventually lead emerging economies to OECD Eden. Countries such as Chile and South Africa can and have, over time, been able to borrow long term in their own currency and have greater monetary policy autonomy given a history of sustained policy credibility.

Even economies with partial policy credibility (such as Mexico, Peru, and Brazil) have been able to use some degree of exchange rate flexibility (and less monetary tightening than otherwise) to adjust to shocks. In Chile, which suffered so visibly from fear of floating in 1998–99, the monetary authorities seem to have realized that they should have allowed the currency to fall more in order to absorb the effects of the fall in copper prices.

5. Exchange rate volatility appears to be more damaging to trade (and the pass-through from exchange rate swings to inflation far higher) in emerging economies than in developed economies.

Emerging market economies may well feel the effects of exchange rate swings more acutely than advanced economies, but one may wonder to what extent these results depend on including within the sample fixed rate regimes that are unsustainable and eventually crash, leading to disruption of trade via credit crunches (as in South Korea, Thailand and Indonesia during the 1997–98 crisis). Currency crashes in economies with fixed rate regimes may in fact be more disruptive of trade than exchange rate volatility in floating rate regimes. Under floating rate regimes, economic agents have an incentive to deal with exchange rate volatility through hedging, adjusting their profit margins, and denominating their exports in particular currencies.

One would, of course, expect that the pass-through from exchange rates to inflation would be larger in small, open economies such as the emerging markets. However, the experience of the 1990s crises is again instructive and somewhat different from Calvo and Reinhart's findings. What is surprising

about the currency crises of the late 1990s is how small the pass-through of currency depreciation to inflation ultimately was—between 10 and 15 percent. In Thailand, South Korea, Russia, and Brazil, the pass-through was very small. In Indonesia, inflation surged in 1998 (and fell sharply afterward), but given the size of the nominal depreciation, the pass-through was considerably smaller. Only in the case of Mexico in 1995 was the pass-through of the domestic currency devaluation to inflation relatively large.

More broadly, how widespread and how justified is emerging fear of floating among emerging economies? I would argue, on both counts: not much. Flexible exchange rates have provided emerging economies with a degree of monetary autonomy and an ability to respond to external shocks. Flexible exchange rate regimes have thus successfully minimized the real effects of economic disturbances. In fact, evidence and experience with flexible exchange rates in recent years, as well as some recent academic research, suggest that the arguments against flexible exchange rates are exaggerated:

1. Policy credibility is gained with sound policies, not with the choice of the exchange rate regime. Fixed rates do not necessarily provide monetary or fiscal discipline, as the collapse of many pegged regimes proves.

2. There is only partial liability dollarization in emerging markets (and little in Asia and South Africa), and sound policies may over time lead to a reduction in the degree of dollarization. Brazil, for example, has more financial indexation than liability dollarization.

3. Countries preserve some degree of monetary autonomy under flexible exchange rate regimes. Eduardo Borensztein and Jeromin Zettelmeyer find that floaters are less sensitive to interest rate tightening than fixers.[3] During the crisis of 1997–99, it was appropriate for countries with floating exchange rate regimes to raise interest rates in response to external shocks, but even countries with fixed exchange rate regimes were forced to tighten their interest rates considerably.

4. Devaluations are contractionary under fixed rates because this regime leads to a buildup of foreign currency liabilities. Depreciations are less likely to be contractionary under flexible exchange rates. Moreover, negative balance-sheet effects occur also in fixed rate regimes when there are shocks that require a real depreciation.[4]

5. Flexible exchange rates provide some shock-absorbing functions when there are terms-of-trade shocks. Christian Broda has demonstrated that the

3. Borensztein and Zettelmeyer (2000).
4. See Cespedes, Chang, and Velasco (2000).

real exchange rate and output fall less sharply under flexible exchange rates than under fixed rates,[5] a finding consistent with the experience of recent years. (Compare the extent of economic contraction in Taiwan and Singapore with that in Hong Kong; or the contractions in Chile, Brazil, Peru and Mexico with that in Argentina.)

6. Inflation targeting and other monetary rules have provided credibility and allowed emerging economies with floating exchange rate (for example, Brazil, Indonesia, Israel, Mexico, Peru, South Korea, and Thailand) to maintain low inflation rates.

7. Although there is not yet a systematic empirical study, the growth, inflation, export, balance of trade, and overall economic performance of countries on a float during the last few years have been satisfactory, as the experience of Brazil, Indonesia, Israel, Mexico, Peru, South Korea, Thailand, and other emerging economies suggests. These countries have regimes that are closer to dirty float rather than pure float, but there is no evidence that emerging markets cannot live with regimes that are closer to floating rates than fixed rates.

In summary, exchange rate flexibility among emerging economies has allowed some monetary autonomy and permitted the exchange rate to perform its shock-absorbing function in the presence of domestic and external shocks (such as terms-of trade shocks, shocks to world interest rates and sudden stops in the flow of capital to emerging markets).

Calvo and Reinhart raise several other points that merit elaboration:

—Even the analytical model in the paper shows the risks of pegged regimes: a devaluation may trigger a loss of access to international capital markets.

—The discussion of lender-of-last resort function should distinguish between systemic banking crises with large fiscal costs where monetization of such costs can lead to high inflation and a Diamond-Dybvig model of bank runs (that is, liquidity crises), where the authorities can provide domestic liquidity without inflation or depreciation. In the latter circumstances dollarized countries may be in trouble because their lender of last resort may have very limited resources.

—Liability dollarization may be exacerbated by fixed rates. Many emerging economies moved to dirty floats in spite of partial liability dollarization and have performed well (Mexico, Brazil, and Chile).

Emerging economies may have a fear of floating, but their recent experience with dirty floats has been relatively successful. Given real and financial shocks of the last decade, one would expect foreign exchange reserves and

5. See Broda (2000a and 2000b).

interest rates to be volatile in emerging markets. The arguments and results in the paper do not necessarily present a strong argument for currency boards or dollarization. Dollarization may entail several costs, and the criteria for optimal dollarization are quite stringent. Finally, many of the results found in the paper may have more to do with the implications of unsustainable soft pegs that eventually collapse than with the effects of regimes of greater exchange rate flexibility.

Ricardo Hausmann: Guillermo Calvo and Carmen Reinhart have written an excellent paper full of surprising stylized facts and new theoretical insights. It will serve as a source of inspiration for many new papers to come.

The paper attempts to establish a set of stylized facts about the behavior of emerging markets that are particularly interesting because they are not a priori obvious:

—It is hard to distinguish alternative exchange rate systems by the ex post amount of flexibility they exhibit. Among countries that float their currency, emerging markets allow less exchange rate flexibility than industrial countries: this "fear of floating" is surprising because a standard floating rate model would predict that because emerging economies are subject to larger real shocks, they should use more, not less, exchange rate flexibility.

—Exchange rate movements in emerging economies do not help stabilize the domestic price of commodities, hence they cannot be said to be used to adjust to this kind of real shock.

—Emerging economies with floating exchange rates allow a higher degree of interest rate volatility.

—There is a positive covariance between depreciations and increases in interest rates in emerging economies.

—Emerging economies show a positive relationship between country risk and depreciations.

—Emerging economies suffer from "sudden stops," that is, crises occur in the context of a much larger swing in the current account.

—Emerging economies have a higher pass-through of exchange rate movements into prices.

These stylized facts are problematic for a Mundell-Fleming interpretation of the world. Under that framework, one would expect countries with larger real shocks to exhibit more exchange rate flexibility. One would expect floating exchange rate countries to exhibit more stable interest rates and less volatile reserves than fixed rate regimes and that depreciations would be expansion-

ary, not contractionary, under such circumstances. And one would not expect currency movements to affect country risk.

So the question is, What do we need in a model to account for these stylized facts? The paper tries to attribute these features to credibility problems in emerging economies. In order to do this, the paper is sprinkled with neat theoretical results relating lack of credibility to some of the stylized facts. For example, the paper shows that lack of credibility may create the expectation of a future rise in the money supply, causing both depreciation and a rise in interest rates in the present period. The paper also shows that depreciations would be contractionary in the absence of capital mobility. Moreover, if a depreciation were followed by loss of access to foreign finance, then its impact would be even more contractionary.

The implicit message of the paper is that the stylized facts are caused by lack of credibility in emerging economies One possibility is that emerging economies with floating exchange rate regimes allow less exchange rate flexibility because they fear that depreciations may signal lack of commitment to low inflation. Hence monetary authorities in these countries react to pressure on the currency by raising interest rates, but given that they lack the exchange rate regime as a commitment device, they are forced to raise interest rates more than more credible floaters or economies with greater exchange rate fixity. As a result these economies end up with a procyclical rather than a stabilizing monetary policy.

A high pass-through may also help explain some of the results. If the pass-through were high, the central bank would try to prevent exchange rate fluctuations by intervening in foreign exchange markets or interest rates. Alternatively, liability dollarization may also account for this result, as currency depreciations would weaken corporate balance sheets, leading to a credit crunch and a contraction of economic activity. In order to avoid this outcome, central banks in emerging economies would also seek more exchange rate stability than the standard model would predict. It is less clear how these latter two explanations relate to lack of credibility.

My main criticism of the paper is that it states that lack of credibility is the principal cause behind the anomalous stylized facts but does not account for the origins of this lack of credibility. The logic is tautological. If country A exhibits these traits, then it must lack credibility. Such a theory is not falsifiable. When I encounter a country B that exhibits different patterns of behavior, am I supposed to attribute that behavior to the fact that it *does* have credibility? And if country A changes its behavior, does it do so because it gained

credibility? All of these patterns are explained through unobservable factors and hence can never be directly tested.

Moreover, this lack of credibility does not seem to have a clear source. It is easy to argue that Latin America's history of inflation and fiscal problems has bequeathed it low credibility and hence "fear of floating." But why should the East Asian miracles, with their history of fiscal probity and low inflation, exhibit fear of floating? Why should they be less credible than Australia or South Africa? Without a theory of what causes credibility, one is left with a very ad hoc interpretation of the stylized facts and a shaky ground on which to base policy.

One alternative is to empirically ground the causes of fear of floating. In a paper coauthored with Ugo Panizza and Ernesto Stein, we studied the behavior exhibited by a sample of thirty industrial and developing countries classified as either floating or having very wide bands.[1] We found strong evidence of fear of floating in developing countries in the sense that these nations float with very large and fluctuating reserves, with very stable exchange rates and very unstable interest rates—in stark contrast with the G-3 countries and even with other industrial countries (see table 1). Interestingly, this sample of countries excludes soft pegs and hence shows that contrary to Nouriel Roubini's comment, fear of floating is not driven by soft pegs.

But what variables can account for this? We were able to show that income per capita and years of experience with floating regimes (a proxy for the accumulated reputation) are essentially orthogonal to the issue. We found surprisingly weak association between fear of floating and pass-through, suggesting that it is not the major actor in this play.

Instead, we found a very strong association between fear of floating and the presence of international debt denominated in a country's own currency. Countries with a significant amount of foreign debt in domestic currency exhibit much more flexibility than countries with foreign debt denominated in foreign currency. The data are shown in table 2. It is constructed by taking all international placements of bonds and money market instruments, calculating all the debt outstanding in a currency, and dividing it by the total debt outstanding by residents of a country. For example, the ratio for the United States is greater than 1 because there is more debt issued in U.S. dollars than there is debt issued by U.S. entities, public or private. What is remarkable is the extent to which this ratio is concentrated among a few countries. More than 90 percent of all

1. Hausmann, Panizza, and Stein (2000).

Table 1. Evidence of Fear of Floating

	International reserves / M2		*Volatility of depreciation /volatility of:* *International reserves*		*Interest rate*	
County	*Level*	*Rank*	*Level*	*Rank*	*Level*	*Rank*
Australia	0.06	25	6.91	5	90.21	3
Brazil	0.25	14	2.92	8	12.13	24
Canada	0.06	26	3.37	7	23.46	12
Chile	0.49	3	0.42	25	7.96	27
Colombia	0.41	5	0.93	19	8.48	26
Czech Republic	0.31	8	1.26	16	13.97	20
Dominican Republic	0.09	23	1.58	14	11.57	25
Germany	0.11	21	2.84	9	157.91	2
Greece	0.36	6	0.39	28	25.02	9
Guatemala	0.30	9	0.42	26	24.94	10
India	0.13	20	1.21	17	3.70	29
Indonesia	0.34	7	2.15	13	23.38	13
Israel	0.26	12	0.76	21	21.38	15
Jamaica	0.25	15	0.27	30	2.75	30
Japan	0.05	28	30.45	1	377.26	1
South Korea	0.24	16	1.35	15	14.14	19
Mexico	0.30	10	0.84	20	6.99	28
New Zealand	0.06	27	12.68	4	23.78	11
Norway	0.29	11	0.36	29	12.34	23
Paraguay	0.26	13	0.62	23	12.38	22
Peru	0.64	2	0.51	24	13.13	21
Philippines	0.24	17	2.32	11	38.50	8
Poland	0.45	4	0.42	27	14.58	18
Singapore	0.88	1	0.69	22	20.00	16
South Africa	0.06	24	2.47	10	22.80	14
Sweden	0.14	19	0.98	18	62.59	5
Switzerland	0.09	22	2.27	12	40.43	7
Thailand	0.23	18	6.62	6	15.16	17
United Kingdom	0.02	29	17.95	3	46.54	6
United States	0.01	30	19.38	2	69.63	4
Averages by country grouping						
G-3	0.06		17.55		201.60	
Other industrialized countries[a]	0.15		5.07		38.42	
Emerging market countries[b]	0.37		1.76		15.65	
Other developing[c]	0.21		0.82		11.06	
Latin American and Caribbean countries[d]	0.42		1.12		9.74	
East Asia[e]	0.39		2.63		22.23	
All countries	0.25		4.18		40.57	

Source: Hausmann, Panizza, and Stein (2000).

a. Australia, Canada, Greece, Israel, New Zealand, Norway, Sweden, Switzerland, and the United Kingdom.

b. Brazil, Chile, Colombia, Czech Republic, Indonesia, South Korea, Mexico, Peru, the Philippines, Singapore, South Africa, and Thailand.

c. Dominican Republic, India, Guatemala, Jamaica, and Paraguay.

d. Brazil, Chile, Colombia, Dominican Republic, Guatemala, Jamaica, Mexico, Paraguay, and Peru.

e. South Korea, the Philippines, Indonesia, Singapore, and Thailand.

Table 2. Ability to Borrow in Domestic Currency

Country or country group	*Country debt as share of debt issued by country residents (bond and money market instruments)*
Australia	0.437
Brazil	0
Canada	0.273
Chile	0
Colombia	0
Czech Republic	0
Dominican Republic	0
Germany	0.872
Greece	0.245
Guatemala	0
India	0
Indonesia	0
Israel	0
Jamaica	0
Japan	1.522
South Korea	0
Mexico	0
New Zealand	1.048
Norway	0.053
Paraguay	0
Peru	0
Philippines	0.019
Poland	0.324
Singapore	0
South Africa	1.173
Sweden	0.076
Switzerland	2.055
Thailand	0
United Kingdom	0.943
United States	2.325
Regional average	
G-3	1.57
Other industrialized countries[a]	0.57
Emerging market countries[b]	0.13
Other developing[c]	0
Latin American and Caribbean countries[d]	0
East Asia[e]	0
All countries	0.443

Source: Bank for International Settlements datasets on bonds and money market instruments.

a. Australia, Canada, Greece, Israel, New Zealand, Norway, Sweden, Switzerland, and the United Kingdom.

b. Brazil, Chile, Colombia, Czech Republic, Indonesia, South Korea, Mexico, Peru, the Philippines, Singapore, South Africa, and Thailand.

c. Dominican Republic, India, Guatemala, Jamaica, and Paraguay.

d. Brazil, Chile, Colombia, Dominican Republic, Guatemala, Jamaica, Mexico, Paraguay, and Peru.

e. South Korea, the Philippines, Indonesia, Singapore, and Thailand.

international issues of bonds and money market instruments takes place in six currencies. For sixteen out of the thirty countries in the sample, the number is 0. For the United States, Japan, and Switzerland it is much greater than 1. Interestingly, the number is large for Australia, New Zealand, and especially South Africa, three countries that show no fear of floating.

It has become commonplace to say that countries expose themselves to currency mismatches because of moral hazard. Nouriel Roubini in his comment argues that soft pegs encourage dollarization because they offer an implicit currency guarantee. This logic would explain why one would observe less borrowing in domestic currency among emerging markets countries than among industrialized countries. It cannot explain why we do not observe international transactions in these currencies by any private corporation, domestic or foreign, or any investment bank anywhere in the world. The evidence is more compatible with inability (rather than unwillingness) to borrow in domestic currency, otherwise referred to as "original sin."

If we take as our exogenous variable a country's ability to borrow in its own currency, then a net foreign debt will imply a net currency mismatch, which simply cannot be hedged, as a dollar debt plus a hedge is equivalent to borrowing in local currency. If it were possible, major banks would offer local currency loans and would hedge the exposure themselves.

The aggregate currency mismatch would explain the contractionary nature of depreciations, through the balance-sheet channel, and would account for the fact that country risk increases and market access declines after depreciations. It would explain why a rational central bank would try to protect the economy by holding very large stocks of reserves and by using intervention with reserves and with interest rates in order to stabilize the currency. The results of our paper show a very strong empirical association between what we take as "ability to borrow" and the symptoms of fear of floating.

But why are some countries able to borrow in their own currency and others not? Is this not equivalent to simply asking why some countries are credible and others not? I do not think so. First, we now have a measurable market phenomenon that we can try to account for and that is not tautologically linked to fear of floating. Second, it shows surprising variance across countries and over time. South Africa's experience with the euro-rand market dates from the mid-1990s. Mexico and Chile have actively attempted to develop an international euro-peso market, albeit with scant success. These experiences may shed some light into what determines a country's ability to borrow in its own currency and hence lead to a further set of questions.

Guillermo Calvo and Carmen Reinhart have produced a paper that is full of stylized facts that need explanation. They provide theoretical hints about potential causes but do not try to show empirically the relevance of the alternative interpretations. The challenge now is to find empirically verifiable explanations of the causes of fear of floating.

General Discussion: Frederic Mishkin pointed out that standard textbook treatments of exchange rate policies, which usually focus on issues from the perspective of industrialized countries, may lead to the wrong policies for emerging market countries. One of the paper's strengths, he noted, is how it illustrates that emerging market countries cannot afford to treat their currency's exchange rate with the benign neglect that industrialized countries can. But the issue, Mishkin argued, is not fixed versus flexible exchange rates; rather, the debate comes down to which monetary and fiscal policy institutions get policymakers to the right place. A key issue is how to constrain discretion properly. In some cases (such as South Korea and Thailand), inflation targeting might be a useful regime to constrain discretion. In the absence of appropriate monetary policy institutions, however, national economies will lack credibility and will be unable to secure the benefits of monetary autonomy.

Ralph Bryant suggested that the likelihood of contractionary devaluations depends on what kind of shock moves the exchange rate. He also argued that a country's ability to borrow in its own currency is very much an endogenous variable. Paul Masson echoed Nouriel Roubini's distinction between floating that involves no long-run commitment and the type of floating that the authors seem to view with concern: one that attempts to smooth fluctuations and reduce volatility over the short term.

Dani Rodrik found that the paper succeeds in raising doubts about whether a pure float could actually work for emerging markets but noted that the question of float is distinct from the question of how useful changes in the nominal exchange rate can be. Rodrik took specific issue with the authors' statement that "devaluations in developing countries have a history of being associated with recessions, not export-led booms," arguing that nearly all the significant growth spurts of the last four decades have been preceded (and to a large extent assisted) by significant currency devaluations. As examples he cited South Korea and Taiwan in the early 1960s, Turkey in 1980, Chile and Mauritius in the mid-1980s, Poland in 1990, and India in the early 1990s.

Alan Blinder took issue with the purported exogeneity of borrowing in local currency, arguing that such borrowing is, in fact, a choice. The more accurate

characterization, he argued, is that it is much more difficult for countries that do not have strong currencies to borrow in their own currencies than it is, say, for the United States or the United Kingdom. The choice of a peg greatly encourages borrowing in foreign currency: people start pretending that one baht is just another name for four cents. When South Africa borrows in rand rather than in dollars, it has to pay a premium of approximately three hundred basis points, but this puts the risk in the hands of the people most willing and able to bear it. Blinder argued that it is the combination of a soft peg and excessive borrowing in dollars that poses the greatest risk. The combination of a dirty float and domestic currency borrowing, even though it will not be as easy for the borrower as it would be for the United States or the United Kingdom, makes for a much more stable environment and a safer system.

Carmen Reinhart added that the inability to borrow in one's own currency is not entirely exogenous but emphasized that borrowing in dollars leads to a vicious circle. Once a government knows that the private sector's capacity to hedge is limited, it may be reluctant (for a variety of reasons) to float its currency. Dollar-denominated obligations, moreover, are not easily satisfied by a country with a weak currency. Ricardo Hausmann noted that Calvo and Reinhart do not make an argument for borrowing in domestic currency and said that it is difficult for an emerging economy to develop a market when it in effect tells the rest of the world, "lend me a lot of money in a unit that I can manipulate." Jeffrey Frankel cited Andrew Rose's finding that adopting a currency union has a large positive effect on trade,[1] and he suggested that the finding implies that there may be some discontinuity at the corners of exchange rate regimes.

Reinhart concluded the discussion by drawing attention to the issue of interest rate volatility. In the United States, the probability that interest rates will rise by five hundred basis points is zero; in Mexico, the probability is 29 percent. She argued that interest rate volatility has deleterious consequences that should not be underestimated.

1. Rose (1999).

References

Arize, Augustine C., Tomas Osang, and Daniel J. Slottje. 2000. "Exchange Rate Volatility and Foreign Trade: Evidence from Thirteen LDCs." *Journal of Business and Economic Statistics* 18 (January): 10–17.

Borensztein, Eduardo, and Jeromin Zettelmeyer. 2000. "Monetary Independence in Emerging Markets: Does the Exchange Rate Regime Make a Difference? (May 2000) (www.worldbank.org/research [November 2000])

Brada, Josef C., and José Mendez. 1988. "Exchange Rate Risk, Exchange Rate Regime and the Volume of International Trade." *Kyklos* 41 (2): 263–80.

Broda, Christian. 2000a. "Terms of Trade and Exchange Rate Regimes in Developing Countries." Massachusetts Institute of Technology, Department of Economics (unpublished).

———. 2000b. "Coping with Terms of Trade Shocks: Pegs versus Floats." *American Economic Review* (forthcoming *Paper and Proceedings*).

Caballero, Ricardo J., and Vittorio Corbo. 1989. "The Effect of Real Exchange Rate Uncertainty on Exports: Empirical Evidence." *World Bank Economic Review* 3 (May): 263–78.

Calvo, Guillermo A. 1983. "Staggered Prices in a Utility-Maximizing Framework." *Journal of Monetary Economics* 12 (September): 383–98.

———. 1999a. "Capital Markets and the Exchange Rate: With Special Reference to the Dollarization Debate in Latin America." Paper presented at the ITAM conference on Optimal Monetary Institutions for Mexico, Mexico City, December 3–4, 1999.

———. 1999b. "On Dollarization." University of Maryland, Department of Economics (April) (www.bsos.umd.edu/econ/ciecpn.htm [November 2000]).

Calvo, Guillermo A., and Enrique G. Mendoza. 1996. "Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold." *Journal of International Economics* 41 (November): 235–64.

Calvo, Guillermo A., and Carmen M. Reinhart. 2000a. "When Capital Flows Come to a Sudden Stop: Consequences and Policy Options" (www.bsos.umd.edu/econ/ciecpp6.pdf ([November 2000]) (forthcoming in *Reforming the International Monetary and Financial System,* edited by Peter B. Kenen and Alexander K. Swoboda. Washington: International Monetary Fund).

———. 2000b. "Fear of Floating" (www.puaf.umd.edu/papers/reinhart/fear.pdf [November 2000]).

Calvo, Guillermo A., Carmen M. Reinhart, and Carlos A. Végh. 1995. "Targeting the Real Exchange Rate: Theory and Evidence." *Journal of Development Economics* 47 (June): 97–133.

Calvo, Guillermo A., and Carlos A. Végh. 1993. "Exchange-Rate-Based Stabilisation under Imperfect Credibility." In *Open-Economy Economics: Proceedings from a Conference Held in Vienna by the International Economic Association*, edited by Helmut Frisch and Andreas Wörgötter, 3–28. Basingstoke, U.K.: Macmillan.

Reprinted as chapter 18 of Guillermo A. Calvo, *Money, Exchange Rates, and Output* (MIT Press, 1996).

Cantor, Richard, and Frank Packer. 1996a. "Determinants and Impact of Sovereign Credit Ratings." *Federal Reserve Bank of New York Economic Policy Review* 2 (October): 37–53.

———. 1996b. "Sovereign Risk Assessment and Agency Credit Ratings." *European Financial Management* 2 (2): 247–56.

Cespedes, Luis Felipe, Roberto Chang, and Andrés Velasco. 2000. "Balance Sheets and Exchange Rate Policy." Working Paper 7840. Cambridge, Mass.: National Bureau of Economic Research (August).

Coes, Donald V. 1981. "The Crawling Peg and Exchange Rate Uncertainty." In *Exchange Rate Rules*, edited by John Williamson, 113–36. St. Martin's Press.

Côté, Agathe. 1994. "Exchange Rate Volatility and Trade: A Survey." Bank of Canada Working Paper 94-5. Ontario (May).

Diamond, Douglas W., and Philip H. Dybvig. 1983. "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy* 91 (June): 401–19.

Edwards, Sebastian. 1986. "Are Devaluations Contractionary?" *Review of Economics and Statistics* 68 (August): 501–08.

———. 1989. *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*. MIT Press.

Frankel, Jeffrey A. 1999. "No Single Exchange Rate Regime Is Right for All Countries or at All Times," Graham Lecture, Princeton University. Essays in International Finance 215, Princeton University, Department of Economics, International Finance Section.

Frankel, Jeffrey A., and Shang-Jin Wei. 1993. "Emerging Currency Blocs." Working Paper 4335. Cambridge, Mass.: National Bureau of Economic Research (April).

Grobar, Lisa Morris. 1993. "The Effect of Real Exchange Rate Uncertainty on LDC Manufactured Exports." *Journal of Development Economics* 41 (August): 367–76.

Hausmann, Ricardo, Ugo Panizza, and Ernesto Stein. 2000. "Why Do Countries Float the Way They Float?" Inter-American Development Bank Research Paper 418. Washington (November).

Kaminsky, Graciela, and Carmen Reinhart. 1999. "The Twin Crises: Causes of Banking and Balance-of-Payments Problems." *American Economic Review* 89 (June): 473–500.

Kenen, Peter B., and Dani Rodrik. 1986. "Measuring and Analyzing the Effects of Short-Term Volatility in Real Exchange Rates." *Review of Economics and Statistics* 68 (May): 311–15.

Larraín, Guillermo, Helmut Reisen, and Julia von Maltzan. 1997. "Emerging Market Risk and Sovereign Credit Ratings." OECD Development Center Technical Paper 124. Paris: Organization for Economic Cooperation and Development (April).

Larrain Felipe, and Andrés Velasco. 1999. "Exchange Rate Arrangements for Emerging Market Economies. Group of Thirty Occasional Paper 60. Washington.

Mann, Catherine L. 1989. "The Effects of Exchange Rate Trends and Volatility on Export Prices: Industry Examples from Japan, Germany, and the United States." *Weltwirtschaftliches Archiv* 125 (3): 588–618.

McKinnon, Ronald I., 1979. *Money in International Exchange: The Convertible Currency System*. Oxford University Press.

———. 2000. "The East Asian Dollar Standard: Life after Death?" *Economic Notes* 29 (February): 31–82.

Medhora, Rohinton, 1990. "The Effect of Exchange Rate Variability on Trade: The Case of the West African Monetary Union's Imports." *World Development* 18 (February): 313–24.

Mishkin, Frederick, and Miguel A. Savastano. 2000**.** "Monetary Policy Strategies for Latin America." Working Paper 7617. Cambridge, Mass.: National Bureau of Economic Research (March)

Morley, Samuel A. 1992. "On the Effect of Devaluation during Stabilization Programs in LDCs." *Review of Economics and Statistics* 74 (February): 21–27.

Paredes, Carlos E. 1989. Exchange Rate Regimes, the Real Exchange Rate and Export Performance in Latin America." Brookings Discussion Papers in International Economics 77. Washington (August).

Powell, Andrew, and Federico Sturzenegger. 2000. "Dollarization: The Link between Devaluation and Default Risk." Central Bank of Argentina and Business School of the Universidad Torcuato di Tella (October 23) (www.utdt.edu/~fsturzen/ powell.pdf [November 2000]).

Qian, Ying, and Panos Varangis. 1994. "Does Exchange Rate Volatility Hinder Export Growth? Additional Evidence." *Empirical Economics* 19 (3): 317–96.

Reinhart, Carmen M. 2000. "The Mirage of Floating Exchange Rates." *American Economic Review* 90 (May, *Papers and Proceedings*): 65–70.

Reinhart, Carmen M., and Peter Wickham. 1994. "Commodity Prices: Cyclical Weakness or Secular Decline?" *International Monetary Fund Staff Papers* 41 (June): 175–213.

Rose, Andrew K. 1999. "One Money, One Market: Estimating the Effects of Common Currencies on Trade." Working Paper 7432. Cambridge, Mass.: National Bureau of Economic Research (December).

Sargent, Thomas J., and Neil Wallace. 1975. "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule." *Journal of Political Economy* 83 (April): 241–54.

Savvides, Andreas. 1993. "Pegging the Exchange Rate and the Choice of a Standard by LDCs: A Joint Formulation." *Journal of Economic Development* 18 (December): 107–25.

Williamson, John. 1995. *What Role for Currency Boards?* Policy Analyses in International Economics 40. Washington: Institute for International Economics.

———. 1996. *The Crawling Band as an Exchange Rate Regime: Lessons from Chile, Colombia, and Israel*. Washington: Institute for International Economics**.**