Fixing for your life

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The Asian crisis took place against a background of exchange rate regimes that were characterized as soft pegs. This has led many analysts to conclude that "the peg did it" and that emerging markets (EMs) should "just say no" to pegged exchange rates. We present evidence that EMs are very different from developed economies in key dimensions that play a key role when it comes to the choice of exchange rate regime--floating for EMs is no panacea. In EMs currency crashes are contractionary, the adjustments in the current account are far more acute. Credibility and market access, as captured in the behavior of credit ratings and interest rates, is adversely affected by devaluations or depreciations. Exchange rate volatility is more damaging to trade and the passthrough from exchange rate swings to inflation is far higher in EMs. These differences between emerging and developed economies may explain EMs reluctance to tolerate large exchange rate movements. In a simple framework we illustrate why large exchange rate swings are feared when access to international credit may be lost.

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I. Introduction

Nearly all the currency crises in the past decade took place against a background of exchange rate regimes that have been characterized--after the fact--as soft pegs. [i] This has led many analysts to conclude that "the peg did it" and that emerging markets (EMs) should "just say no" to fixed exchange rates. This advice seems paradoxical in light of the fact that most EMs have precarious access to international capital markets in the best of times and no access in the worst of times and that market access is often contingent on the stability of their currencies.

This paper argues that, in fact, "floating" exchange rates are far from a panacea for EMs and that this policy advice misses a number of important real world considerations that are crucial for developing countries. We present evidence that EMs are, indeed, very different from developed economies in several key dimensions that are bound to play an important role when it comes to the choice of exchange rate regime. In EMs devaluations, or large depreciations for that matter, are contractionary, the adjustments in the current account are far more acute and abrupt. Currency crises become credit crises as sovereign credit ratings often collapse following the currency collapse 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 by more damaging to trade and the passthrough from exchange rate swings to inflation is far higher in EMs than in developed economies. These differences between emerging and developed economies are significant and may help explain EMs historic and present reluctance to tolerate large fluctuations in their exchange rates." [ii] 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. [iii]

Section II presents some evidence on the "fear of floating" syndrome. In Section III, we 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 EMs, and present some evidence on the extent of passthrough from exchange rates to prices. In Section IV, we present an analytical framework that examines the case where the credibility loss translates into an inability to borrow from abroad and a devaluation can lead to a contraction in output. Other reasons for fearing large exchange rate movements, including the role played by liability dollarization and an ineffective lender of last resort, are also discussed. The last section discusses the implications of this analysis for the choice of exchange rate arrangements in EMs.

Section II. Fear of Floating: Some Evidence

In this section, we present evidence that, despite the relatively recent increase in the ranks of countries that are classified as "floaters" or "managed floaters," nominal exchange rates, in fact, show little variation in most EMs. We recap a few of the results presented in our earlier work, in which we analyze the monthly behavior of exchange rates, international reserves, base money, and interest rates for a broad array of countries during 1970-1999. [iv]

In what follows, however, we limit our attention to the time series properties of monthly percent changes in the exchange rate. [v], [vi] Despite occasional bouts of foreign exchange market intervention, sometimes even in co-ordinated fashion, the United States dollar (US $) floated about as freely against the German Deutschemark (DM) and now the euro and the Japanese Yen (¥) as any currency is allowed to float. For this reason, we compare countries that have regimes

that are classified as freely-floating or managed-floating against this “G-3" benchmark.

We can glean what actual policy practices are by analyzing the frequency distributions of exchange rates around chosen intervals and comparing these across countries and regimes. According to the IMF’s classification scheme, countries are grouped into four types of exchange rate arrangements: peg, limited flexibility, managed floating, and, freely-floating. Limited flexibility has, almost exclusively, been used to classify European countries (prior to the monetary union) with exchange rate arrangements vìs-a-vìs one another (i.e., the Snake, the Exchange Rate Mechanism, etc.). Hence, it is possible to evaluate the probability of a particular change or changes in the exchange rate, reserves, etc. conditional on the announced exchange rate regime.

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

For example, if $x^c = \mid 1\ \% \mid$, (i.e., ε lies within a plus/minus one percent band), then, $P(\varepsilon < x^c \mid \text{Peg}) > P(\varepsilon < x^c \mid \text{Float})$. That is, the probability that the monthly exchange rate change falls within the one 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 DM for the European countries and with respect to the United States dollar for everyone else. The choice of the DM was owing to the fact that this was the most prominent reserve currency in Europe and, as Germany was the low inflation country for many years, currencies in Europe were largely tied

to the DM. For the remaining countries the dollar is the usual anchor currency of choice, as the largest share of EM's external debt is denominated in US 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, $x^c = \left| 1\ \% \right|$, and $x^c = \left| 2.5\ \% \right|$, which is a comparatively narrow band.[vii] For the United States, for example, less there is about a 59 percent probability that the monthly US $/DM exchange rate change falls within a relatively narrow plus/minus two-and-a-half percent band. For the $/¥ exchange rate, that probability is slightly higher at 61 percent. By contrast, for Bolivia, Canada, and India (all declared floaters during that period), that probability is in the ninety-four-to-ninety-six percent range.[5] 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 2-½ percent on any given month (versus more than 40 percent for the US $/DM). On average, for the current set of floaters, the probability that the exchange rate change will be contained in this moderate plus/minus two-and-a-half-percent band will be over 79 percent--significantly above that for the U.S. and Japan. [viii] However, by this metric, post-crisis Mexico approximates a float more closely than any of the others--including Canada. [ix]

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 two-and-a-half percent is nil--this was also the case for Indonesia and Korea up to the 1997 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 do not vaguely resemble that of the US $/DM or US $/¥, with a significantly higher proportion of observations falling within a narrow band; in the case of Singapore, there is an eighty-nine percent probability that monthly exchange rate changes are within a two-and-a-half-percent band, while for Chile that probability is only moderately lower. On average, there is an eighty-eight percent probability that managed floaters' monthly changes in the exchange rate are confined to this narrow band. This exchange rate stability versus the US dollar (or DM if it is a European country) is surprising in light of the fact that for many of the emerging market countries during these episodes, inflation rates have been well above those observed for the United States and terms-of-trade shocks are frequent and large.

Not surprisingly, Table 3 shows that for limited flexibility arrangements, the probabilities that exchange rate changes are confined to this band are even greater, at ninety-two and ninety-five percent respectively. Hence, the observed behavior according to the exchange rate regime accords with the priors stated in equation (1). What is most surprising is the narrowness of wedge across regimes. While the mean probability that the exchange rate is contained inside a two-and-a-half percent band differs significantly when comparing the fixed exchange rate regime with the "freely" floating, other differences across regimes are blurred. For example, the average probability that $\varepsilon < |2.5\ \%|$ for "freely" floating regimes is not significantly different from that for managed floating, which, in turn, is not significantly different from the "limited flexibility" arrangement. There is also no statistically significant difference between the limited flexibility category and the pegged exchange rate. [x]

Furthermore, the results presented in our earlier work show that for most countries, interest rate and reserve variability are significantly higher than for the G-3, attesting to active

policies to smooth exchange rate fluctuations either by direct intervention in the foreign exchange market or by open market operations. [xi] Our results suggest that, even in many of the countries that are classified as having a high degree of exchange rate flexibility, there is widespread fear of floating.

III. Emerging Markets Are Different: Some Stylized Facts

In this section we document some of the key differences between EMs and developed economies that may help explain why EMs 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. We discuss EMs problems with the loss of access to international capital markets, the contractionary effects of devaluations or depreciations, and the effects of chronic credibility problems. The evidence on the adverse impact of exchange rate uncertainty on trade and the problems EMs may face owing to a higher inflation passthrough are also examined in an effort to understand why exchange rate variability is so widely resisted.

1. The Sudden Stop Problem

In this subsection, we begin by briefly sketching what is meant by the sudden stop, SS, problem, or the immediate drying up of access to world financial markets; we then go on to assess its empirical content. 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. [xii] Our sample includes twenty-five countries, which are listed in Appendix Table 1; the data span the period 1970 through 1999, which includes 96

currency crisis episodes. [xiii] Twenty-five of these crises are in developed economies, while the remainder are in EMs.

By national income accounting 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, has to be met by reserve losses or by a reduction in the current account deficit. In practice, both take place. While 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 see this, note that the current account deficit equals aggregate demand minus GNP. 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 GNP. The decline in aggregate demand, in turn, falls on both the demand for tradables and nontradables. The excess supply of tradables thus created can be shipped abroad, but the nontradables are, by definition, bottled up at home. Thus, the relative price of home to 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 recent crises.

From here, what is the process producing a loss of output and employment? Two channels can be identified, depending on the nature of the contract that is inadequate to react to a deflationary impulse: (1) Keynesian, and (2) Fisherian. The Keynesian channel is straightforward, familiar, and 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.

In contrast, the Fisherian channel is less familiar but, in our view, potentially more damaging. Financial contracts are, as a general rule, contingent on very few "states of nature," i.e., objective variables, like terms of trade, profit, demand, etc. 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 are not conditioned to their future realizations. 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 SS calls for a lower relative price of nontradables with respect to tradables. Because the price of tradables is stable, to achieve a lower relative price of nontradables with respect to tradables, the nominal price of nontradables must fall. Thus, since the interest rate is invariant with respect to SS, there is a surge in the *ex post* real interest rate faced by nontradables' producers, increasing the share of nonperforming loans. In the remainder of this subsection, we document the incidence and magnitude of the SS problem for emerging and developed economies.

Table 4 reports averages across the 96 currency crises in our sample of the current account deficit as a percent of gross national product (GDP) and the growth in GDP around the year of the crisis year (T). [xiv] 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 differences between the two groups are also reported with an indication as to whether these are statistically significant at the conventional levels.

The general pattern in the current account deficit and economic growth are quite similar for EMs and developed economies; in both groups of countries, the currency crisis produces both a reduction in the current account deficit and in growth. [xv] Hence, at least in this sample, devaluations in neither group that accompany crises are expansionary, as suggested by most standard textbook models. [xvi] However, there are also important differences between EMs and developed countries. The sudden stop problem in EMs, as measured by the current account adjustment between T-1 and T+1, is almost five times as large (about 3.5 percent versus 0.7 percent) as that for developed economies. Furthermore, the difference between the two groups of countries is significant at standard confidence levels. As we will show later in this section, that larger adjustment in the current account may be the outcome of EMs involuntary loss of access to international capital markets in the wake of currency crises. [xvii] Indeed, in Section III, we will present a simple analytical framework that suggests that lack of credibility is likely to be at the heart of this key difference between emerging and developed markets 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.

In that light, as shown in Table 4, it is not surprising that the magnitude of the recession following the currency crash is also significantly greater for EMs. While the growth slowdown for developed economies is less than 0.2 percent (which is not statistically significant from zero), the recession in EMs is far more marked, with a reduction in growth of about 2 percent. [xviii] This 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 pre-crisis performance highlights more clearly the gap between EMs and developed economies.

Furthermore, as shown in our earlier work, the severity of the recessions appears to be worsening in the 1990s. [xix] Indeed, in the subset of crises in the 1990s there is an actual **contraction** in output--not just a sharp slowdown in growth.

One, possibly crucial, reason for the deeper recessions and larger current account adjustments in EMs following currency crises is that these countries do not enjoy the international standing of their developed counterparts and, hence, EMs may face substantial difficulties in obtaining external financing during the period following a devaluation/depreciation. One indication of how international capital markets view these countries can be gleaned by examining the evolution of credit ratings around these episodes. In the next subsection, we formally explore this issue by studying the incidence and magnitudes of sovereign credit rating downgrades during these currency crises episodes.

2. Loss of Access to International Capital Markets: An Emerging Market Problem

In what follows, we examine the behavior around financial crises of sovereign credit ratings issued by Moody's Investor Service and Institutional Investor (II). The II sample begins in 1979 and runs through 1999. For the Moody's ratings, we have an unbalanced panel. [xx] The subset of the currency crises examined, as before, are those listed in Appendix Table 1. For II, the ratings are an index that runs from zero (least creditworthy) to 100 (most creditworthy). The II rankings are reported twice a year and are changed frequently. For Moody's, which uses multiple letters to characterize a sovereign's creditworthyness, we map their letter ratings into sixteen possible categories, with sixteen corresponding to the highest rating and zero to the lowest. [xxi] This scale is reproduced in Table 5. The ratings may be changed at any time, hence

we have the month during which any changes took place. Unlike the II rankings, rating changes are far more rare.

Tables 6 and 7 present several results from the analysis of the II and Moody's sovereign ratings, respectively. We report a variety of statistics that are meant to capture the various manifestations of the extent and the terms of access to international lending around currency crises episodes. The statistics reported include: the probability of a downgrade for various time horizons following the currency crisis, the probability of multiple downgrades, and the level of the assigned rating at the time of the crisis, and six and twelve months following that event. We also report the percent 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. Significant differences are denoted by one or more asterisks, depending on the significance level.

Turning to the II results first, as shown in the top panel of Table 6, we find no significant differences between developed countries and EMs in the probability of a downgrade (or multiple downgrades) following the currency crisis. However, this is where the similarities among the two country groups end. It is worth noting (see middle panel, Table 6) that at the time of the crisis, the average rating for the EMs is 37.6, slightly less than half of the average score for developed countries. 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 EMs than it is for developed economies. On average, EMs's sovereign rating index

falls 10.8 percent in the twelve months following the currency crisis. The differences between the post-crisis downgrade for emerging and developed economies is significant at standard confidence levels.

The gulf between EMs and developed economies is even greater when a comparable exercise is performed for the Moody's ratings. As with II, the level of the ratings at the outset of the currency crisis is significantly lower for EMs--the sovereign rating level is about a third of that assigned to developed economies. Also, as the II results, the magnitude of the downgrade is far greater for EM--about 9 percent versus less than one percent for developed countries. However, as shown in Table 7, in the case of Moody's sovereign ratings, both the probability of a downgrade in the twelve months following the crisis and the probability of multiple downgrades is significantly higher for the EMs in our sample.

To complement the preceding analysis, we examine whether knowing that there was a currency crisis indeed helps to predict sovereign credit rating downgrades for emerging and developed economies. For II, 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. [xxii] The method of estimation is generalized least squares, correcting for both generalized forms of heteroskedasticity and serial correlation in the residuals. For Moody's, the dependent variable is three-month changes in the rating, while the explanatory variable is the crisis dummy three months earlier. The latter specification will allow 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 minus one, zero, or one, 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 are summarized in Table 8 for both II and Moody's ratings. In the case of EMs, currency crises help predict downgrades, irrespective which rating index is used. For developed countries, however, there is no conclusive evidence that ratings react to currency crises in a systematic and significant way. For EMs, however, 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 five percent. This difference in the reaction of sovereign ratings between developed economies and EMs is not entirely surprising, in light of the preceding discussion about the more severe slowdowns that follow currency crises in EMs. To the extent that the 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 the findings of other authors, who find evidence of two-way causality between sovereign ratings and market spreads. [xxiii] 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.

3. Exchange Rate Volatility and Trade: EMs are Different

While the preceeding analysis has focused on the differences between EMs and developed countries in periods of market stress, in the next three subsections we turn our attention to differences that are always present--crisis or no crisis. Given the outwardly-oriented

growth strategy pursued by many EMs 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; our focus is on what these studies reveal about the differences between EMs and developed economies.

There are a large number of studies that have attempted to examine the link between exchange rate uncertainty and trade for industrial countries. Some studies, such as Kenen and Rodrik (1986), found that real exchange rate volatility has adverse consequences for the imports of several developed economies. Yet, other studies (see Mann, 1989, for example,) found little evidence of any systematic effects. In general, the results from this literature are quite mixed, at least as far as industrial countries are concerned. [xxiv] While the body of work that examines the link between exchange rate volatility and trade is thinner for EMs, most of the existing studies appear to find more consistent patterns in the data. In general, this literature, which is largely summarized in Table 9, seems to point in the direction that exchange rate variability has deleterious effects on trade, through its impacts on either EM exports to the rest of the world or EM imports. As shown in Table 9, only one of the papers that focuses on EMs--Medhora (1990), which examines the imports of the West African Monetary Union--finds no link between exchange rate volatility and trade. Taken together, these findings would seem to support those of Rose (1999), who using data for 186 countries over the 1975-1990 period, finds that countries that share a common currency trade three times as much with each other as those who lack the common currency.

The more conclusive evidence that trade is adversely affected by exchange rate volatility

in EMs is not entirely surprising and may owe to several features of the EMs themselves. First, as McKinnon, for example has shown, the patterns of trade invoicing are markedly different in EMs and industrial countries. [xxv] In explaining what he calls the East Asian dollar standard, he 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 primary commodities remain overwhelmingly dollar invoiced.* [xxvi]

The preceeding statement is particularly relevant for EMs, even those that have little trade with the United States, as many of these countries' exports have a high primary commodity content. Indeed, the evidence presented in some studies on a developed countries, reveals that invoicing patterns matter in determining the effects of exchange rate volatility on exports. [xxvii]

While in earlier subsections we focussed on why EMs may fear depreciations or devaluations, as the case may be, and in this section we turned our attention to exchange rate volatility, EMs also tend to fear the consequences of large real appreciations. Appreciations are resisted, not only for the obvious reason that it erodes international competitiveness, but also because of concerns about Dutch-disease-type problems. Such concerns are especially commonplace when countries are attempting to diversify their export base. [xxviii]

A second feature of EMs that may explain why real exchange rate volatility has a negative effect on trade is the incomplete nature of its capital markets. Exporters and importers in developed countries, where futures markets are relatively well developed, have the tools to

hedge exchange rate risk. In EMs, futures markets are either illiquid or nonexistent. Hence the central bank's behavior (the fear of large exchange rate swings) may reveal an effort by the authorities to replicate the conditions for exporters and importers that capital markets provide for in the developed world.

4. Inflation and Exchange Rate Pass-through Issues

Another reason why EMs 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 passthrough issue merits considerable attention, especially in the context of countries that have adoted or are thinking of adopting inflation targets. [xxix] In this subsection, we explore the empirical content of this issue with the aim of exploring whether emerging markets are also different in this regard.

Estimates of exchange rate passthrough 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.

We estimate for each exchange rate regime, a bivariate vector autoregressive (VAR) model in inflation and exchange rate changes. The regimes covered in this exercise total 41 in number and cover the cases shown in Tables 1-3. [xxx] While 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 passthrough may depend on the type of exchange rate arrangement. Second,

the VAR approach treats both variables a potentially endogenous. This is particularly importantwhere EMs are concerned, as Appendix Tables 3-5 attest. There are several instances where the relationship runs from inflation to exchange rates, as countries follow a purchasing power of parity rule. [xxxi] Third, it allows the data to reveal what the dynamic relationship between the two variables of interest are, as the lag length for the VAR is selected on a case by case basis according to the Swartz criteria. This is particularly valuable when it comes to comparing high and low inflation countries, as in the case of the former the passthrough tends to be more immediate.

Table 10, provides a summary of the incidence and magnitude of exchange rate passthrough. [xxxii] Two features of the results stand out. First, the percent of cases where the block-exogeneity tests indicate that the lagged exchange rate change has a statistically significant effect on inflation is 43 percent for EMs versus 13 percent for developed countries. Secondly, the average passthrough is about 4 times as large for EMs as for developed economies. Taken together, these results may also help understand EMs intolerance to large exchange rate fluctuations--especially devaluations or depreciations. [xxxiii]

5. EMs: The Chronic Credibility Problem

Earlier in this section we presented evidence that EMs access to capital markets is precarious even in the absence of a crisis. This credibility problem is reflected sovereign credit ratings that are vastly inferior to those that prevail for developed countries--even prior to a devaluation. This lack of credibility also permiates the magnitude and abruptness of the sudden stop problem discussed earlier. In this subsection, we present yet another manifestation of the

chronic credibility problems faced by many EMs.

Recalling that interest rates are an intertemporal price and, as such, 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 EMs as in developed economies; and that gap widens even further if we include countries with a history of chronic inflation. [xxxiv] This gap between the low and chronic inflation EMs is hardly surprising. Many EMs have a weak revenue base and a rudimentary tax collection system, this combination has driven many a country, particularly in Latin America, to use and abuse the inflation tax--Calvo dubs this problem the "Political Fiscal Gap." [xxxv] As firms and households take into account the possibility of being taxed in this manner, credibility problems will be exacerbated and translated into high and volatile interest rates. As we will show in the next section, this interest rate volatility may be the outcome of procyclical policies that are responding to unstable expectations.

Taken together, the evidence of the preceding subsections suggest that EMs may have solid grounds for resisting and fearing devaluations and exchange rate variability at large. Not only are currency crises contractionary, but they are associated with large and significant changes in countries' ability to borrow from international sources. The marked and systematic declines in credit ratings for EMs 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 EMs, one may expect to find a generalized tendency in their policies to limit

exchange rate fluctuations, at least when compared to the currency swings we observe in the developed economies that allow their exchange rate to float freely. The next subsection presents selective evidence on this issue by comparing the extent of exchange rate variability that is to be found in the data, irrespective of the announced exchange rate arrangement.

IV. Varieties of Fear of Floating

In the previous section, we presented evidence that there is a widespread fear of large exchange rate swings, made understandable by the fact that devaluations (or depreciations) in EMs tend to be contractionary. Furthermore, in the case of Ems. these appear to be accompanied by an erosion of credibility (as revealed by deteriorating credit ratings). Indeed, the erosion in credibility may be so severe so 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.

1. Managing Monetary Policy

Despite their heterogeneity, EMs 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 this 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

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

following Cagan form: [xxxvi]

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 periods 2 onwards takes a

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

constant value $\overline{m}$. Then one can show that in a Rational Expectations equilibrium we have Thus, the exchange rate in period 1 (which we could identify with the *present*) is a weighted average of present and future money supply. Moreover, and by the same token, $e_t = \overline{m}$, 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 that the nominal interest rate $i_t = e_{t+1} - e_t$

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

satisfies

Case 1. Permanent Increase in Present *m*. Suppose that the economy was at steady state (i.e., money supply constant at $\overline{m}$) and it is shocked by an unanticipated once-and-for-all increase in the supply of money in period 1. By (2) and (3), *the exchange rate suffers a permanent devaluation accompanied by **no** interest rate volatility*.

Case 2. Permanent Increase in Future *m*. By (2) and (3), *a permanent increase in future money supply* $\overline{m}$ (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, 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 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. [xxxvii]

To increase realism, let us assume that the central bank pays interest i^m on money, and

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

that the demand for money satisfies:

where "~" on variable *m* is a reminder that it refers to interest-earning money. It can readily be

$$m_t = \tilde{m}_t - \alpha i_t^m .$$

verified that equations (2) and (3) are still valid for the present version, if one defines

Hence, under this interpretation, raising central-bank-controlled (CBC), 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, $\overline{m}$, could be partially or fully offset by raising CBC interest rates (recall equation (2)), a typical policy followed in EMs when the exchange rate threatens to rise sharply. Interestingly, by (3), 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 EMs have exhibited a *pro-interest-rate-volatility* bias.

If policy makers 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, but always steering clear from perfect interest rate stability. Therefore, credibility problems may bias the outcome towards lower exchange rate and higher interest rate volatility, as borne by the facts.

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

2. The Role of Loss of Access to International Capital Markets

While the previous subsection discussed the conduct of monetary policy when credibility is absent, in this subsection, we focus on cases in which lack of credibility is so intense that the

country loses access to capital markets. This is a first-approximation to the serious capital-market difficulties that EMs 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 EMs presented in Section II suggests that this capital market problem is far more generalized than the examples provided by the recent crises in Asia and Russia. [xxxviii]

Consider an economy with tradable 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 lump-sum rebates all income to the representative individual. Moreover, consumption is subject to a cash-in-advance constraint that takes the following form:

$$m_t \geq e_t c_t + h_t,$$

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

We will 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 the countries' ability to borrow abroad. Sweden, for example, has even been able to externally finance domestic bank rescue packages. In contrast, devaluations in EMs have been accompanied by a serious interruption of external financing. Therefore, the analysis of the two polar cases will hopefully help us to better understand why devaluations in EMs are linked to output loss, while the opposite happened in advanced economies.

Let us assume that the economy starts at a steady state and has zero foreign assets or liabilities. Let us denote the supply of tradables by y. For simplicity, we 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-

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

order condition is satisfied (interior solutions are assumed throughout):

which is the familiar equality between marginal rate of substitution and relative price. Hence,

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

before and after devaluation the following condition holds under perfect capital mobility:

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

output of home goods). [xl]

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,

$$m_0 = e_\infty y + h_\infty = e_0 c_0 + h_0,$$

where the subindex "∞" denote 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 like B and, as noted above, home-good output rises. Thus, given that tradables' consumption remains the same while its price goes up, and consumption of home goods rises, it follows from equation (1) that, on impact, real monetary balances have to increase and be larger than m_0. However, by condition (4), 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 are largely comprised of 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 advanced economies and EMs 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. In contrast, in all recent EMs 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 countries that have poor access to the capital market to be reluctant to devalue in order to relieve balance-of-payments difficulties. [xli] 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. [xlii] This is an additional reason for EMs to exhibit devaluation-aversion and, thus, generate a smoother exchange rate path.

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 is at the root of why output in advanced economies and EMs reacted so differently to speculative attack on their currencies. Devaluation in advanced countries came as a result of an attack on their currencies that did not put their creditworthiness into question. In contrast, in all recent EMs crises, there was an attack, 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.

3. Ineffective Lender of Last Resort.

A very popular 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, LOLR. This view is based on the conjecture that, since sums involved in bank bailouts are usually huge, an effective LOLR should be able to issue its own money.

Typically, bank regulation allows banks to hold fractional reserves against deposits and imposes non-prohibitive 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. A possible 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 LOLR capabilities costless to the central bank and beneficial to the private sector.

Diamond and Dybvig, DD, formalized self-fulfilling bank runs in terms of a *non-monetary* model. [xliii] This highly quoted paper gives welfare grounds for the liquidity mismatch, and shows that, as a result, banks would be 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 LOLR. 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. [xliv]

Another drawback of DD is that it is a *real* model and, hence, cannot directly address the issue of whether relinquishing the issuance of one's own money could seriously impair the effectiveness of the LOLR. 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 mechanic application of DD might suggest that this would be effective in preventing self-fulfilling bank runs. But this is wrong. In a monetary 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 (e.g., regulation Q). Then, if depositors expect a BOP crisis, there will be a bank run which the government cannot stop by the mere artifact of issuing money. Indeed, the act of issuing money will actually worsen the BOP 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 DD in a monetary economy). Under those circumstances, though, bank runs could cause BOP crises. First note that 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 (e.g., land) or foreign exchange. As a result, if the central bank is unable

to sterilize the extra bailout liquidity, the price level and/or exchange rate are bound to take a sharp upturn, unless the central bank has enough reserves to back up a large aggregate like M2. [xlv] 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 LOLR 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 because 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 would go under water either because interest rates on their liabilities rise substantially more than on their assets or, if that kind of interest-rate mismatch is avoided, because their loans become nonperforming.

To keep depositors from fleeing the banking system, deposits could be indexed to prices (e.g., UDIs in Chile) or exchange rates. The latter, i.e., "dollarization" of deposits, is a very popular practice in EMs. Indexation provides an automatic mechanism to implicitly raise deposit interest rates when expectations of a bank run arise. Its advantage over domestic-currency denominated deposits is that the inflation/devaluation component of the interest rate is only paid if inflation/devaluation occurs. Thus, banks' fundamentals are less likely to be undermined. This helps to explain, incidentally, why deposit indexation is so popular in EMs. However, indexation increases the burden on the LOLR 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.

Why do advanced countries, like the US, manage to have an effective LOLR? The

answer suggested above is simple: advanced countries never lose access to capital markets. [xlvi] 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 LOLR capabilities in countries that are credit-constrained. Moreover, a limited LOLR gives rise to indexation of deposits. Aside from Chile, where the UDIs have been a very successful indexation to a domestic price level, and Brazil for a limited period of time, all other cases involve indexation to a hard currency (typically the US dollar). This, in turn, induces banks (sometimes due regulatory reasons) to extend dollar loans. Given that domestic banks have a comparative advantage in lending to domestic residents, those loans will likely be channeled to them (and not recycled to the rest of the world). [xlvii] 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 problem in some sectors of the economy. This is an additional reason for the fear of floating.

4. 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 nontradable sector, would shy away from foreign-exchange denominated loans. This is so because they will now face a larger *currency* risk than under fix. This sounds convincing, but it misses two important points: (1) most EMs start from a situation of partial dollarization (at the

very least, liability dollarization), and (2) it is really very hard to find instances in which an EM completely ignores exchange rate volatility. These points reinforce each other. 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. [xlviii] This fear of floating induces more liability dollarization, creating a vicious circle from which it is very hard to exit. [xlix]

Fear of floating and lack of the discipline that underlies fixed exchange rates may drive authorities to adopt additional control measures, like 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 interest rate volatility associated with them as well as 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.

V. Concluding Remarks

Going beyond superficial classifications and taking the wealth of evidence at hand, 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. As shown in earlier, 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 markets to allow for much fluctuation in their exchange rate are multiple. In this paper we investigate a few. When circumstances are favorable (i.e.,there are capital inflows, positive terms-of-trade shocks, etc.), many emerging market countries are reluctant to allow the nominal (and real) exchange rate to appreciate.[1] This probably stems from fears of the "Dutch disease" type problems--loss of competitiveness and serious 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 comes from pervasive liability dollarization, as in most emerging markets the debt of both the government and the private sector are largely denominated in hard foreign currency. As shown here, devaluations/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, the authorities may resist large swings in the exchange rate because of their inflationary consequences and the credibility problems these may feed. As shown here, even in the best of times, exchange rate volatility appears to hinder trade--which is so essential to EMs. We have shown that the pass-through from exchange rates to prices is higher for EMs. 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

If fearing significant exchange rate swings continues to be the serious policy issue it has been in the past, and if, as the stylized facts suggest, EMs remain dollarized both in terms of their

debt and the invoicing of trade 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 grounds on which to expect that EMs will "simply float." Indeed, as the dust settles following the Asian crisis and capital flows aggresively 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, like 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.

In summary, much of the glitter of "flexible" exchange rates disappears upon closer examination. The extra degrees of freedom provided by exchange rate flexibility are fallacious or can be substituted by fiscal policy. In reality, it appears that in EMs what prevails are varieties of soft pegs--despite their poor track record. Which raises the issue of why bother having a national currency in the first place--specifically, dollarization.

A 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 more of 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 Euroland.

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

Country	**Period**	**Probability that the monthly percent change in nominal exchange rate falls within:**	
		+/- 1 percent band	**+/- 2.5 percent band**
United States $/DM	**February 1973-April 1999**	**26.8**	**58.7**
Japan	**February 1973-April 1999**	**33.8**	**61.2**
Australia	January 1984-April 1999	28	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	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 U.S. and Japan		51.67	79.27
Standard deviation, excluding U.S. and Japan		17.83	11.41

Source: Based on Calvo and Reinhart (2000).

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

Country	**Period**	**Probability that the monthly percent change in nominal exchange rate falls within:**	
		+/- 1 percent band	**+/- 2.5 percent band**
Bolivia	January 1998-April 1999	100	100
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	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
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 (2000).

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

Country	Period	Probability that the monthly percent change in nominal exchange rate falls within:	
		+/- 1 percent band	+/- 2.5 percent band
France	March 1979-April 1999	86.7	97.5
Greece	January 1998-April 1999	40	80
Malaysia	January 1986-February 1990	71.4	98.1
Spain	June 1989-April 1999	67	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 (2000).

Table 4. Current Account Adjustments and GDP Growth
Before and After Currency Crises

Country group	T-1 (1)	T, currency crisis year (2)	T+1 (3)	Change from T-1 to T+1 (4)	Change/ Pre-crisis (4)/(1) (5)
Current account deficit as a percent of GDP					
Emerging markets	-4.86	-3.97	-1.39	3.47	-77.8
Developed countries	-2.84	-3.06	-2.10	0.74	-26.1
Difference	-1.62	-0.91	0.71	2.73**	
Percent change in real GDP					
Emerging markets	3.61	1.27	1.62	-1.99	-55.0
Developed countries	1.73	1.49	1.58	-0.15	-8.7
Difference	1.88**	-0.22	0.04	-1.84**	

Sources: The World Bank and the authors.
Notes: A total of ninety-six currency crises, of which twenty-five are in developed economies and the remainder are in emerging markets. Two asterisks (**) denote significance at the five percent level.

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 and the authors.

Table 6. The Probability and Magnitude of Downgrades Around Currency Crises: Institutional Investor Sovereign Credit Ratings, 1979-1999

	Probability of (in percent)		
Country Group	**a downgrade in six months following the crisis**	**a downgrade in twelve months following the crisis**	**more than one downgrade in the twelve months following the crisis**
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**	**12 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 the downgrade in (percent change)		
	six months following the crisis	**the next six months**	**the twelve months following the crisis**
Emerging	4.3	6.9	10.9
Developed	1.4	0.5	1.9
Difference	2.8*	6.4**	8.9**

Notes: One asterisk (*) denotes significance at the ten percent level, while two asterisks (**) denote significance at the five percent level.

Table 7. The Probability and Magnitude of Downgrades Around Currency Crises: Moody's Sovereign Credit Ratings, 1979-1999

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

Note: An asterisk (*) denotes difference is significant at the ten percent level, while two asterisks denote significant differences at the five percent level.

Table 8. Reactive Credit Ratings: Developed and Emerging Markets

Dependent variable: Institutional Investor six-month changes in sovereign rating		**Estimation method: OLS 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 (3)**	**Pseudo R^2 (4)**
Developed	-0.08	0.90	0.901	0.001
Emerging	-0.27**	0.14	0.048	0.04

Note: An asterisk (*) denotes difference is significant at the ten percent level, while two asterisks denote significant differences at the five percent level.

Table 9. A 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)	30 countries of which 14 are EMs, 1973-1977	Dummy variable was assigned to designate whether a country has a fixed or flexible exchange rate.	Cross section	Mixed results, **for EMs** exchange rate **uncertainty inhibits** bilateral exports.
Frankel and Wei (1993)	63 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 OLS and instrumental variables	Mixed results. Small negative significant effect in 1980; positive significant effect in 1990.
Savides (1992)	62 developed and emerging economies, 1973-1986	Attempts to separate expected and unexpected variability of the real exchange rate	Two step procedure for cross-sectional export s.	Only the unexpected variability measure has a negative and significant effect on export volumes, this result is robust when the countries are disaggregated into developed and EM groups.
Emerging economies only				
Arize, Osang, and Slottje (2000)	13 EMs, Quarterly data, 1973-1996 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 the volatility of the real effective exchange rate, exert a **significant negative** effect on exports in both the short and long run in all 13 countries.
Caballero and Corbo (1989)	6 EMs, 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.

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

Study	**Period and country coverage**	**Volatility/risk measure**	**Estimation method and approach**	**Key findings**
Emerging economies only				
Coes (1981)	Brazil, 1965-1974, annual data	real exchangerate variability and also dummy for crawling peg period	log- linear demand for Brazilian exports	The **reduction** in exchange rate uncertainty during the crawling peg period **significantly increased** exports.
Grobar (1993)	10 EMs, 1963-1985, Argentina, Brazil, Colombia, Greece, Malaysia, Mexico, Philippines, South Africa, Thailand, and Yugoslavia	Four uncertainty indices capturing diffrent measure of real exchange rate volatility.	Export supply by SITC category . Pooled time-series, cross-sectional data, fixed effects.	Most of the export categories were **adversely affected** by exchange rate uncertainty.
Medhora (1990)	West African Monetary Union	Real exchange effectiverate variance.	Import demand equations	Found **no evidence** that exchange rate variability affected African imports.
Paredes (1989)	Chile and Peru	Various measures	Manufactured exports, log-linear specification for individual countries.	Volatility has a **significantly adverse** effect on exports.

Table 10. A Summary of the Incidence and Magnitude
of Exchange Rate Passthrough

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

Sources: International Financial Stastistics, International Monetary Fund and the authors, based Appendix Tables 3-6.
Notes: Two asterisks denote significance at the five percent level or higher. Deatils of the country and period coverage are provided in Apprendix Tables 3-6.

Table 11. Credibility Problems and Financial Volatility

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

Note: Two asterisks (**) denote difference is significant at the five percent level.
Sources: International Financial Statistics, various central banks. Calculations based on Calvo and Reinhart (2000)

Appendix Table 1 Country coverage, January 1970-December 1999

Africa:		
South Africa		
Asia:		
Indonesia	**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**

Appendix Table 2 Currency crisis dates

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

Appendix Table 2 Currency crisis dates (continued)

Country	Currency Crisis
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*

Appendix Table 2 Currency crisis dates (concluded)

Country	Currency Crisis
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

*** Twin crises episode.**

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

	Exchange rate equation, ε		**Inflation equation, π_t**	
	ε	**π_t**	**ε**	**π_t**
United States/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**

Note: Entries in bold indicate significance at the ten percent level or higher.

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

	Exchange rate equation, ε		**Inflation equation, π_t**	
	ε	**π_t**	**ε**	**π_t**
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**

Note: Entries in bold indicate significance at the ten percent level or higher.

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

	Exchange rate equation, ε		**Inflation equation, π_t**	
	ε	**π_t**	**ε**	**π_t**
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

Note: Entries in bold indicate significance at the ten percent level or higher.

Appendix Table 6. Exchange Rate Pass-through Coefficients

Country	Exchange Rate Arrangement and Dates	Coefficient of ε in inflation equation
Emerging Markets		
Bolivia	Float, September 1985-December 1997	0.474
Bolivia	Managed floating, January 1998,-November 1999	1.001
Indonesia	Float, August 1997-November, 1999	0.062
Malaysia	Managed floating, 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 floating, March 1980-November 1997	0.014
South Korea	Float, December 1997-November 1999	0.085
Turkey	Managed floating, January 1980-November 1999	0.256
Uganda	Floating, January 1992-November 1999	0.147
Uruguay	Managed floating, January 1993-November 1999	0.468
Venezuela	Managed floating, 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

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

Endnotes

i. At the time of the crisis, Korea and Malaysia were self-classified as managed floats, Indonesia had an exchange rate band and the Philippines *de jure* label was freely floating.

ii. See also Hausmann, Panizza, and Stein (1999), for a discussion of these issues.

iii. "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 United States dollar. More broadly, however, EMs display a chronic **fear of a large swing in their currencies**, as also evidenced by the lengths countries go to avoid a devaluation, when their exchange rates are pegged.

iv. Their data is monthly and covers thirty- nine countries in Africa, Asia, Europe, and the Western Hemisphere during the January 1970-April 1999 period. The countries are Argentina, Australia, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Cote D'Ivoire, Egypt, Estonia, France, Germany, Greece, India, Indonesia, Israel, Japan, Kenya, Korea, Lithuania, Malaysia, Mexico, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Singapore, South Africa, Spain, Sweden, Thailand, Turkey, Uganda, Uruguay, the United States, and Venezuela. One-hundred-and-fifty-four exchange rate arrangements are covered in their sample.

v. The exchange rate is end-of-period.

vi. Calvo and Reinhart (2000) also analyze 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.

vii. 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 prior to December 1994--which had an "ever-widening" band, as the lower end (appreciation) of the band was fixed and the upper ceiling (depreciation) was crawling--Israel, and Colombia during 1994-1998.

viii. 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.

ix. The variance of the monthly changes Mexican peso/US $ is about twice as large as the variance of the monthly changes in the ¥/US $ exchange rate.

x. For the FF-PE means test the probability value is (0.00); for the FF-MF it is (0.04); for the MF-LF means test the probability value is (0.32); and for the LF-PE it is (0.44).

xi. See Calvo and Reinhart (2000).

xii. All of these crises ended with a devaluation.

xiii. The dates of these currency crises are listed in Appendix Table 2.

xiv. We define a currency crises,as in Kaminsky and Reinhart (1999), who construct an index of exchange market pressure. This captures reserve 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.

xv. Although for the developed countries, the pre- and post-devaluation difference in growth is not significantly different from zero.

xvi. The textbook story 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 why total demand might fall.

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

xviii. For the contractionary consequences of devaluations in developing countries, see also Edwards (1986) and (1989) and Morley (1992). In both of these studies focus on devaluation episodes, even when it was not associated with a crisis.

xix. See Calvo and Reinhart (1999).

xx. An unbalanced panel, in this case, refers to the fact that we do not have the same number of observations for all the countries.

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

xxii. We want to examine whether the rating changes follow immediately after the crises, but as the index is only published twice a year, this ability to discriminate is not possible.

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

xxiv. See Côté (1994) for a comprehensive survey of this literature.

xxv. See McKinnon (1979).

xxvi. McKinnon (1999).

xxvii. See Quian and Varangis (1994).

xxviii. See Reinhart and Wickham, (1996).

xxix. See, for example, Mishkin and Savastano (1999).

xxx. For an alternative approach to this issue, see Hausmann, Panizza, and Stein (1999).

xxxi. See Calvo, Reinhart, and Végh (1996), on this issue.

xxxii. These results are based on Appendix Tables 3-6.

xxxiii. Of course, while a high passthrough 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 we will return to in the next section.

xxxiv. The results are based on the episodes shown in Tables 1-3. For country-specific details see Calvo and Reinhart (2000).

xxxv. Calvo (1999).

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

xxxvii. 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.

xxxviii. For further evidence about the sizable credit cut in EMs during recent crises, see Calvo and Reinhart, 1999.

xxxix. Thus, the economy exhibits all the characteristics of the model in Calvo and Vegh (1993), which permits us to skip the technical discussion.

xl. Over time *e* will return to its initial steady state and, hence, initial expansion will vanish. However, this analysis will not be pursued here because we just wish to focus on impact effects.

xli. 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 one would get 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.

xlii. See Calvo and Mendoza (1996).

xliii. Diamond and Dybvig (1983).

xliv. DD 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.

xlv. But this should be ruled out in this example because, otherwise, the country would not be credit constrained.

xlvi. This may change for Japan if forecasters are right and in a few months domestic public debt reaches 130 percent of GDP!

xlvii. After the 1998 Russian crisis, however, banks in Latin America have exhibited a much lessened appetite in lending to the domestic private sector.

xlviii. This was also the case for Mexico prior to the Colosio assassination, despite an announces ever-widening band.

xlix. Fear of floating may also arise whenever domestic firms utilize foreign raw materials. In this case, floating is less destructive than in the previous example but it can still cause financial difficulties in the medium term.

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