Exchange Rates and Financial Fragility

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Introduction

If one positive thing can be said about the Asian crisis and subsequent discussions of how to strengthen the international financial architecture, it is that they breathed new life into a moribund debate on the consequences of exchange-rate arrangements**.** Curiously, early contributions to post-Asia literature about how to make the world a safer financial place said little about the choice of exchange rate regime, focusing instead on transparency, prudential supervision, policy toward capital flows, and IMF reform.[1] The emphasis in recent writings is different; there, the exchange rate has taken center stage.[2]

In a sense, this shift reflects a maturation of the debate—a recognition that exchange-rate policy and the other items on the architects' agenda are connected. The exchange rate has an important influence on the volume capital flows. It is a key determinant of the response of local interest rates to global credit conditions**.** There is a close connection between the exchange rate and financial fragility, although its nature is a matter of dispute.

In what follows, we distinguish three views of the relationship between the exchange rate and financial fragility.

The moral hazard hypothesis. The first view, which of the three has

received the most attention, emphasizes moral hazard and, in particular, the distorting consequences of implicit guarantees. These guarantees stem from the disposition of governments to provide bailouts to domestic financial-market participants and from the willingness of the international community to rescue countries in trouble. They imply that investors do not face the full risks of their investments, which, in turn, creates an incentive to take on excessive risk. It is this excessive risk taking that is at the root of financial fragility.

The corresponding solution is to reduce moral hazard through more vigorous supervision and regulation of the financial system and by replacing international rescues with workouts that require private-sector burden sharing. Putting moral hazard back in the bottle also requires reform of the exchange-rate system. Pegged exchange rates are a form of implicit guarantee and, hence, a source of moral hazard. They promote unhedged foreign-currency borrowing and, because they are least credible at long horizons, skew financial flows toward the short end. These unhedged, short-term, foreign-currency-denominated liabilities are a time bomb waiting to explode. By implication, more flexible exchange rates are desirable to limit short-term capital inflows and buttress the stability of the financial system.

The original sin hypothesis. The second view emphasizes an incompleteness in financial markets we call "original sin." This is a situation in which the domestic currency cannot be used to borrow abroad or to borrow long term, even domestically. In the presence of this incompleteness, financial fragility is unavoidable because all domestic investments will have either a currency mismatch (projects that generate pesos will be financed with dollars) or a maturity mismatch (long-term projects will be financed with short-term loans).

Critically, these mismatches exist *not* because banks and firms lack the prudence to hedge their exposures. The problem rather is that a country whose external liabilities are necessarily denominated in foreign exchange is, by definition, unable to hedge. Assuming that there will be someone on the other side of the market for foreign currency hedges is equivalent to assuming that the country can borrow abroad in its own currency. Similarly, the problem is *not* that firms simply lack

the foresight to match the maturity structure of their assets and liabilities; it is that they find it impossible to do so. The incompleteness of financial markets is, thus, at the root of financial fragility.

It follows that both fixed and flexible exchange rates are problematic. If the government allows the currency to depreciate, the currency mismatch will cause bankruptcies. If, instead, it defends the peg by selling reserves and hiking interest rates, it will precipitate defaults on short-term domestic debts. The solution, rather than a more flexible exchange rate, is no exchange rate — dollarization or its euro equivalent.[3] Once the dollar is adopted for all domestic payments, currency mismatches dissolve, since income streams are now denominated in the same unit as liabilities. Maturity mismatches are attenuated because it now becomes easier to issue long-term paper in dollars. The greater willingness of foreigners to lend at long maturities and of residents to leave their money at home deepens domestic financial markets, rendering them less fragile and crisis prone.

The commitment problem hypothesis. A third view sees financial crises as resulting from neither moral hazard nor original sin but from the weakness of the institutions that address commitment problems. In contrast to a textbook spot market, where the parties meet once to complete their transaction, financial contracts are discharged over time. Creditors lend their money today but have to wait until tomorrow to be repaid. Financial transactions, in other words, are intertemporal trades carried out over time. Inevitably, therefore, problems of commitment and enforcement arise. Transactions that are mutually desirable ex ante may not be mutually desirable ex post. The borrower might be better off, for example, if he or she did not have to repay.[4] This means that financial agreements are not necessarily self-enforcing. It is one way of understanding why financial markets are contract intensive and rely on judicial enforcement, and why the volume of transactions is small and outcomes are volatile, where the contractual, legal, and judicial infrastructure is least adequate.

If this is the problem, then the solution lies in policies to improve the financial infrastructure. Examples include steps to strengthen property rights and titles, to provide for rapid attachment of collateral, and

to develop credit bureaus. The implications for exchange rate policy are less clear. On the one hand, there is an argument for greater flexibility to free the authorities to backstop the market, which in conditions of institutional underdevelopment is likely to be particularly fragile and in need of official support. If they are committed to a fixed rate, the central bank and government may be prevented from providing lender-of-last-resort services. They will be prevented from engineering a surprise inflation to bring down the real value of otherwise unsustainable debts and save the banking system. At the same time, however, lenders will understand the authorities' incentive to resort to this tax of last resort and demand higher interest rates in compensation. And higher interest rates will make the financial system more fragile to the extent that debts grow faster than the capacity to service them.

Outline of the paper. Are these three views incompatible, and, if so, which one is correct? What are the implications for the exchange rate regime and monetary policy?

We start by further elaborating the connections between exchange rates and financial fragility. We then confront our theories with the relevant facts. Which theory can best explain the volume of capital flows? Which theory can best explain their composition? Which theory can best explain the nature of crises in emerging markets?

Following this, we consider three case studies with the potential to shed further light on the competing interpretations. Finally, we explore the implications of our theories for the future of monetary policy and the international financial architecture.

The moral hazard hypothesis

The moral hazard hypothesis is a problem in financial systems with the following characteristics:

— banks are leveraged,

— banks have limited liability,

— markets have asymmetric information about the risks banks take, and

— banks are rescued with some probability when they get into trouble.

This is to say that moral hazard is a problem, to a greater or lesser extent, in all financial systems. These four characteristics create incentives for excessive risk taking because depositors or taxpayers pay for the bad outcomes, while bankers pocket the good ones. This is one way of understanding why financial markets are regulated. In particular, regulations require banks to hold sufficient capital to ensure that their money and not that of depositors or taxpayers is lost at the margin. To make sure that the actual and bookkeeping capital coincide, banks are supervised, and supervisors are empowered to inspect banks' books and take control of their operations when capital is low or other problems arise that are likely to tempt managers to gamble for redemption.

If banks are well managed and regulated, the expansion of their balance sheets will be limited by their capital, not by the availability of funds. But when regulation is lax and the moral hazard associated with the financial safety net is present, banks may expand their balance sheets excessively by borrowing abroad. When international markets are flush, banks will have access regardless of their capitalization and the quality of their management. This leads to the notorious lending-boom problem, when banks use foreign funding to compete for domestic market share and the quality of bank assets deteriorates (Gavin and Hausmann 1996). And if capital flows reverse direction, a very serious financial crisis can ensue.

A long line of emerging-market crises has been interpreted in this light. Balino (1987) attributes the Argentine banking crisis of 1980-81 to inadequate implementation of prudential regulations and lax bank supervision.[5] Bisat, Johnston, and Sunararajan (1999) attribute Chile's 1982 financial crisis to a weak supervisory framework (especially before 1980) and to an ownership structure conducive to excessive lending by related entities. They similarly attribute the severity of

the concurrent crisis in the Philippines to "a failure to enforce supervisory rules....various banking irregularities exacerbated by the political environment; and excessive risk taking by bank holding companies through newly created and inexperienced subsidiaries" (p.137).

If the problem is moral hazard, then the solution is to remove implicit and explicit guarantees and develop alternatives to international bailouts. Until significant progress is made in achieving these goals, care should be exercised in liberalizing the capital account. In particular, policy should be used to prevent more short-term foreign borrowing than the financial system can safely support. Inspired by this logic, the international community has been pressing for the removal of blanket guarantees and exploring ways of "bailing in" the private sector. The Basle Committee of Banking Supervisors has proposed revisions to the 1988 Capital Accord to make short-term bank-to-bank lending more expensive. The U.S. Treasury and the IMF, for their part, have evinced sympathy for the use of Chilean-style holding-period taxes to avoid excessive dependence on short-term foreign debt.[6]

A pegged exchange rate is a specific instance of this genus of implicit guarantees. To sustain the peg, the authorities will insist that there is absolutely no prospect of it being changed. (Otherwise it might be subject to attack immediately.) The government, in effect, is offering the private sector insurance against the risk of exchange-rate changes. In this situation, borrowers have little incentive to hedge their foreign exposures.[7] The pegged exchange rate will be a source of moral hazard (Mishkin 1996, Obstfeld 1998, Buiter and Sibert 1999).

The Asian crisis is frequently taken as illustrating these points. Table 1 summarizes the incentives for unhedged borrowing as portrayed by the World Bank. The table purports to show how the low volatility of exchange rates compared to the mature markets led investors to believe that the authorities were insuring them against exchange risk. The consequence of this combination of an exchange-rate guarantee and a financial safety net, it is argued, was to cause a large amount of short-term foreign capital to be intermediated through the banking system, as shown in Table 2.[8] BIS and IFS data differ. But

Table 1
Macroeconomic Conditions Related to Unhedged Foreign Currency Borrowing in East Asia, January 1991–June 1997

Country	Interest rate spread[a]	Average annual appreciation[b] (+) vs. U.S. $	Exchange rate volatility[c]
Indonesia	11.5	-3.8	.7
Republic of Korea	4.1	-3.2	3.4
Malaysia	1.6	1.2	2.6
Philippines	6.5	.9	3.8
Thailand	4.0	-.3	1.2
Memorandum items			
Germany	1.2	-2.0	6.4
Japan	-2.2	2.5	10.7

[a] Local deposit rate less LIBOR (U.S.$) for East Asian countries. Local LIBOR less LIBOR (U.S.$) for Japan and Germany. Interest rate spread in percentage points.
[b] Relative to the U.S. dollar (in percent); a minus sign indicates depreciation.
[c] Standard deviation of percentage deviation of exchange rate (U.S.$) from regression on a time trend.
Source: World Bank (1999).

both show that Asian banks and firms accumulated large net foreign exposures in the run-up to the crisis.[9] To be sure, in some countries such as Thailand banks were required to hedge their positions by acquiring offsetting assets in foreign currency, but they did so by making foreign-currency loans to domestic corporations, which became the repositories of the unhedged exposure. In other countries, notably Indonesia, corporations borrowed offshore directly (Table 3), but their unhedged exposures created credit risk for domestic banks that also extended them domestic-currency loans. In both cases, the accumulation of unhedged exposures was fostered by, in the words of the World Bank, "exchange rate stability in...countries that had pegged currencies to the dollar or to baskets of currencies with a high dollar weight" (World Bank 1999, p.61).[10]

Table 2
Foreign Exposure of Banks and Finance Companies
(Percent)

	Ratio of foreign liabilities to M2			Ratio of foreign liabilities to assets		
	1990	1994	1996	1990	1992-96	1996
Indonesia	1.2	7.0	3.2	108	193	143
Republic of Korea	4.4	8.3	14.1	140	149	174
Thailand	6.1	25.1	32.8	265	519	775
Argentina	33.7	10.1	9.5	313	197	158
Brazil	20.6	10.0	17.3	207	177	282
Mexico	55.3	66.8	44.7	901	750	498

Source: IMF International Financial Statistics.

The policy recommendation that flows from this analysis is greater exchange rate flexibility. With the exchange rate fluctuating more freely, banks and corporates will better appreciate the need to hedge their exposures. Their greater propensity to hedge will mean that large exchange-rate changes, when they come, will not devastate their finances. Because the havoc wrought by large exchange rate movements will be less, the IMF can credibly commit not to always run to the rescue of shaky currencies. And constructive ambiguity about whether international assistance will be forthcoming will limit the moral hazard associated with the presence of the IMF.

Dollarization is also an acceptable solution, although it is not often recommended by advocates of the moral-hazard view. If financial fragility results from the combination of unhedged exposures and large exchange rate changes, dollarization eliminates the problem by removing the second component from the mix. The caveat, of course, is that it not substitute other equally or more serious sources of financial fragility, for example by removing portions of the financial safety net under an accident-prone banking system. And observers disagree about how long dollarization that respects this caveat will take to achieve.

Table 3
Corporate Debt Composition,
Selected Asian Economies, 1996
(Percent)

	Foreign debt		Domestic debt	
Economy	Short-term	Long-term	Short-term	Long-term
Indonesia	20.5	19.6	31.4	28.5
Republic of Korea	29.4	17.0	27.7	25.8
Malaysia	32.1	11.0	35.7	21.2
Philippines	19.7	21.3	25.5	33.5
Taipei, China	22.3	19.2	23.9	34.6
Thailand	29.6	12.3	32.0	26.1

Source: Asian Development Bank (1999).

The original sin hypothesis

Our second view seeks to explain why financial markets in developing countries are fragile and crisis prone in terms of three national characteristics: good economic prospects, openness to international capital flows, and a national currency that cannot be used by local firms or the government to borrow abroad and cannot be used, even at home, for long-term borrowing.

If a developing country is economically promising and open, it will be attractive to investors. But if its currency cannot be used for foreign or long-term borrowing, firms needing external finance will have to choose between borrowing in foreign currency or borrowing short term. If a company borrows in dollars to finance a project that generates pesos, peso devaluation can thrust it into bankruptcy. If, instead, it finances its long-term projects with short-term domestic-currency loans, it will go bust if interest rates rise and credits are not renewed. Unavoidably, investments will suffer from a currency mismatch (because projects that generate local currency are financed with dollars) or a maturity mismatch (because long-term investments are financed with short-term loans).

Original sin seems to capture a fact about the world. What causes it is an open question. One hypothesis is that a history of inflation and depreciation renders investors reluctant to invest in domestic-currency assets and to invest long term. In fact, however, original sin appears to apply as well to more than a few emerging markets that do not have a recent history of high inflation. Essentially, all non-OECD countries have virtually no external debt denominated in their own currency.

Another hypothesis is that sovereign risk renders investors reluctant to invest in domestic-currency-denominated assets. If a country was able to borrow abroad in its own currency, it would stand to benefit by depreciating that currency and, thus, eroding the real value of its external debts. In anticipation of this, foreigners are unwilling to lend in a denomination that the borrower can manipulate unless they are compensated to an extent that only those borrowers planning to devalue are prepared to pay. In the presence of incomplete information about borrower type, the market could disappear.

Why then are some developed countries able to borrow abroad in their own currencies? It may be that they developed their domestic markets first, creating a political constituency that opposed opportunistic depreciation. Foreigners were only willing to participate after a substantial domestic demand existed.

The currency and maturity mismatches caused by original sin create a dilemma for exchange-rate policy. If the government seeks to defend the currency by hiking interest rates and draining liquidity from the financial system, banks faced with the increased cost of funding will be forced to contract their portfolios by calling their loans. If borrowers are unable to repay immediately due to maturity mismatches, a banking crisis can result. Under these circumstances, the financial system may be subject to self-fulfilling runs. If people think that other people are about take their money out because they fear that the interest-rate defense will bring down the banking system, they will want to be first through the door, requiring the authorities to raise rates to defend the currency and producing the very result investors most feared.[11] This is the basis for the now-prevalent view that pegged

exchange rates and open international capital markets are an accident waiting to happen in all but the most financially robust emerging markets.

If, on the other hand, the authorities let go of the peg and permit the exchange rate to float more freely, banks and corporates will be hammered by currency mismatches. As the exchange rate starts to fall, moreover, firms fearful of further depreciation will scramble to purchase foreign exchange to cover their exposures. This will cause the domestic currency to depreciate further.[12]

The implication is that allowing the exchange rate to float is counterproductive, since banks and firms will be hammered by the currency mismatch problem. The central bank will be reluctant to let the exchange rate move too much, lest the dollar liabilities in the financial system precipitate widespread bankruptcies. Calvo and Reinhart (1999) have a nice name for this. They call it "fear of floating." Experience in Asia and Latin America suggests that central banks whose currencies officially float often use monetary policy to limit exchange-rate variability. They attempt to do so even in the face of massive terms- of-trade shocks, like those suffered by Chile, Peru, and Venezuela in 1998. To limit the movement of their currencies, they raise interest rates.

As a result, interest rates will be volatile, even more than in fixed-rate economies. This interest-rate volatility will complicate the development of a long-term bond market, as these assets will have unstable prices.[13] Exchange-rate and interest-rate volatility will lead investors to demand a higher return on domestic-currency deposits, jacking up the level of interest rates.[14] Moreover, letting the exchange rate appreciate in good times and depreciate in bad times reduces the incentive for residents to hold assets in the domestic currency, since doing so does not provide insurance against income risk. When incomes are high and residents are in a position to save, the value of their previously accumulated savings goes up as a result of currency appreciation. In bad times, when income is low and residents might wish to dip into their savings, their assets are worth less because of currency depreciation. They have an obvious incentive to insure themselves against

income risks by moving their savings out of domestic currency.[15]

Not only does floating have costs when markets suffer from the incompleteness we posit, but its benefits can also be questioned. It has not obviously allowed monetary policy to be used in countercyclical ways. Interest rates in emerging markets go up instead of down in recessions, even more sharply under floating than under the typical fixed-rate regime.

The alternative to floating is not to peg, which is also problematic, but abandoning the national currency all together. Dollarizing—abandoning a weak national currency for a stronger international or supranational currency—would eliminate currency and maturity mismatches because debts would be denominated in the same unit as cash flow. It would also these countries to borrow longer term. And its effects would be enhanced if they were accompanied by deeper integration of the domestic financial system with the rest of the world through the internationalization of the banking sector.

A world of international or supranational currencies, the conclusion follows, would be safer for capital mobility. Interest rates would become less volatile, as we have seen in Europe where rates have fallen in the continent's chronically high interest-rate countries (such as Ireland, Italy, Portugal, and Spain), making it easier to cut budget deficits and stimulate growth. Safe capital mobility would accelerate the income convergence between advanced and emerging markets, again as in Europe, and permit the exploitation of differences in demographic trends in the two regions. It would move capital to the south, where the labor force is growing faster, and thus maintain high returns to capital in the north, easing the financial burden of aging.

The commitment problem hypothesis

Financial markets are contract-intensive because of the time-inconsistency problem intrinsic to intertemporal trade. Borrowers, in general, lack incentives to repay and need to be able to commit. If they are unable to do so, creditors will view lending as risky and will charge accordingly. But higher interest rates exacerbate the incentives for

non-payment and make the pool of available projects riskier through adverse selection.[16] Even if the market does not disappear, it can be characterized by rationing.

One common commitment device is collateral, which transfers ownership of an asset in the event of non-payment. If the collateral is worth more than the loan, the borrower does not benefit from not paying. But if property rights are weak, the assets that can be used as collateral will be limited. If it is difficult to attach collateral, borrowers will be less able to commit.

Another common commitment device is reputation. In a world of one lender, borrowers will know that he or she who does not repay will not get another loan. The same applies in a world of multiple lenders if they share information on credit performance. This, of course, is the economic function of credit bureaus and rating agencies.

The point is that collateralization and reputation do not typically emerge as equilibrium results of isolated agreements between borrowers and lenders — the market alone does not supply them, in other words. Rather, doing so requires a social arrangement in whose absence the market will be small and risky. La Porta et al. (1996, 1997) and Levine (1998) provide evidence that the strength of creditor rights and their enforcement affect the depth and liquidity of private debt markets.

What about equity? If the institutions of corporate governance are weak, equity investors will have reason to fear that management will siphon off profits. They will be willing to invest only at price-earning ratios that make it unattractive to go public. Equity markets will be shallow not because firms are unprofitable but because shareholders do not know to whom the profits will accrue. Lenders will then want to keep corporations on a short leash by providing only short-term credit.

Finally, at the international level there is sovereign risk. Because sovereigns cannot be forced to abide by the rulings of the court, their commitment problem is unusually severe. This leads to small, rationed, and unstable sovereign debt markets.[17] Reputation can sub-

stitute, but to what extent that is disputed (Bulow and Rogoff 1989, Ozler 1991).

Insofar as these institutional inadequacies are at the root of financial fragility, the solution is institutional reform. Property rights should be strengthened. Efficient and autonomous judicial systems should be established and charged with contract enforcement. Credit bureaus should be developed to facilitate the use of reputation. Adequate accounting and auditing standards should be adopted to limit the information asymmetries that weaken market discipline.

At the international level, the commitment hypothesis would argue for care in adopting mechanisms that facilitate bailing in the private sector in times of crisis. While it is good to have investors face the real risks of lending to emerging markets, easing nonpayment might make it harder for borrowers to signal their willingness to repay and, thus, aggravate sovereign risk, causing international lending to become smaller and more expensive. This is the emerging-market countries' objection to collection-action clauses and to the international community's new emphasis on comparability and burden sharing.

The implications for exchange-rate policy are less obvious. Where the financial infrastructure is least developed, the markets may most need a lender of last resort, and the lender of last resort may most need the freedom conferred by a flexible currency policy. At the same time, investors anticipating that the authorities may resort to this tax of last resort will demand higher spreads. This may lead to a self-fulfilling crisis insofar as expected devaluation means that interest rates are high, causing liabilities to grow more than planned and leading to a solvency crisis.

Which theory fits the facts?

Gauging the explanatory power of these interpretations means considering their testable implications.

The level of capital flows. By any measure, capital flows are small.[18] International comparisons of capital/labor ratios (Lucas 1990) and

comparisons of flows within nations with flows between them (Bayoumi and Rose 1993, Bayoumi 1997) both suggest that the global allocation of resources would be more efficient if there was additional capital transfer between rich and poor countries. In the 1990s, capital flows to Latin America have averaged 5 percent of GDP. With a capital-output ratio of 3, this means that capital flows have averaged less than 2 percent of the capital stock. At present, the capital/labor ratio in the United States is some 300 percent higher than in Latin America. At a rate of 2 percent per year, convergence would take centuries, not even considering the fact that labor-force growth is faster in Latin America.

That flows are small poses the greatest difficulty for the moral-hazard view, which predicts that flows should be large. That investors face artificially low risks implies that they should be willing to invest more than is socially optimal. So, the moral hazard hypothesis would predict too much, not too little capital flowing across borders. This does not mean that moral hazard is absent. It does imply, however, that moral hazard is not the only policy-relevant distortion and, arguably, not the most important.

The fact that capital flows are small is consistent with the original-sin hypothesis. More capital does not flow from rich to poor countries because it can only flow in a form that generates mismatches, which discourage lending and heighten the fragility of the financial system. This fact is also consistent with the commitment-problem hypothesis in which more capital does not flow from rich to poor countries because sovereign risk and inability to commit at the domestic level make additional lending unattractive. More borrowing and lending does not take place not because of currency risk but because the contractual environment cannot support it.

Thus, while moral hazard may be present, its tendency to encourage excessive capital flows could be more than offset by our two other forces, both of which work in the opposite direction. For example, lending to Russia in the first half of 1998 could have been depressed, relative to the first-best equilibrium, by the weakness of the institutional framework for contract enforcement and creditor rights. At the

same time, however, financial flows were artificially stimulated relative to what they would have been otherwise by the "moral hazard play" (the perception on the part of international investors that the country was too big to fail geo-politically and would be the recipient of an international bailout). This indicates that the moral-hazard reform agenda may help to limit irresponsible lending but without necessarily addressing the other underlying problems.

The composition of flows. The moral-hazard hypothesis has strong implications for the composition of capital flows. It predicts that flows will take the form or forms most likely to benefit from a bailout. Banks are particularly likely to be bailed out because of the perceived threat to macroeconomic and financial stability posed by large or widespread failures. Governments are particularly likely to be bailed out insofar as they are the recipients of IMF support. If moral hazard is the dominant story, then lending should be skewed toward these borrowers.

Table 4 presents data on the structure of lending by BIS reporting banks. It shows that developing countries, in fact, have proportionally less debt flowing through banks than developed countries (32 versus 40 percent) and more debt flowing through non-banks (53 versus 50 percent), while the proportion going to governments is roughly the same (15 versus 14 percent).[19]

Table 5 shows the proportion short-term debt owed to BIS reporting banks. It shows that developed-country banks did not skew their emerging-market lending toward the short end relative to their lending to advanced countries. The amount of short-term lending by BIS reporting banks is roughly comparable across all regions, uncomfortably for the moral-hazard view.[20]

While bank-to-bank lending was massive in East Asia, so was foreign lending to corporates, which is harder to explain in terms of moral hazard. Korean *chaebol* may be bailed out, but not Indonesian corporations. In addition, there were very large investments in the stock market, a form of lending—the Hong Kong Monetary Authority's intervention in the Hang Seng to the contrary notwithstanding—that carries the least probability of a bailout.

Table 4
Structure of the Debt Owed to BIS Reporting Banks, 1998
(As a percentage of total debt owed to BIS reporting banks)

	Banks	Government	Nonbanks	Short-term
All countries	35.34	14.34	49.51	52.43
Developed country	39.60	13.83	46.30	54.19
Australia	41.72	7.18	50.86	55.03
Portugal	59.84	8.08	31.66	65.87
Eastern Europe	44.83	14.43	40.52	49.07
Czech Republic	53.87	6.09	39.82	56.15
Poland	35.79	22.78	41.23	42.92
Developing countries	31.76	14.91	53.20	54.58
Latin America	23.71	20.13	55.90	55.22
Argentina	18.19	19.34	62.45	57.38
Brazil	31.34	17.48	51.01	63.12
Chile	15.08	7.06	77.38	45.51
Colombia	25.63	20.93	53.44	39.06
Mexico	18.64	29.22	52.04	44.81
Peru	34.23	5.51	60.26	77.31
Venezuela	10.27	40.77	48.89	39.81
Asia	37.00	9.04	53.90	53.03
Indonesia	13.69	15.65	70.66	54.07
Republic of Korea	56.57	6.75	36.58	45.08
Malaysia	30.79	6.62	62.47	48.21
Philippines	45.05	12.61	42.31	56.39
Thailand	26.09	4.29	69.60	59.26
Hong Kong	53.70	.72	45.01	75.23

Source: BIS Consolidated International Banking Statistics.

Table 5
Structure of the Debt: Short-Term and Debt from Banks, 1998
(Percent)

	Short-term debt	Debt to BIS reporting banks
Latin America	25.7	59.8
Argentina	18.1	60.8
Brazil	22.9	48.4
Chile	46.1	98.4
Colombia	22.1	71.0
Mexico	25.4	55.1
Peru	30.2	43.7
Venezuela	14.9	41.5
Asia	50.0	86.0
Indonesia	37.0	60.1
Republic of Korea	68.5	119.9
Malaysia	46.3	85.3
Philippines	36.0	60.2
Thailand	62.0	104.8
Eastern Europe	29.8	50.6
Czech Republic	49.1	74.9
Poland	10.6	26.3

Source: World Bank (Global Development Finance), Bank for International Settlements Data (Consolidated International Banking Statistics), Joint BIS-IMF-OECD-World Bank statistics on external debt.

The moral-hazard hypothesis has an especially hard time accounting for the composition of capital flows to Latin America. International commercial banks have been minor players in Latin America in the 1990s. Portfolio flows were the single most important form of finance as major Latin American corporations sought to the international capital markets. It is hard to imagine a less likely candidate for a bailout.[21]

The lack of a short-term bias by BIS reporting banks also poses something of a problem for the commitment hypothesis. When it is difficult to monitor the agents who control borrowed funds and to enforce the contract specifying their use, lenders will utilize short-term debt as a disciplining device, since the knowledge that the loan will be rolled over only if specific conditions are met should encourage the borrower to adhere to the terms of the loan agreement and reveal information about his or her compliance. Yet, the extent of short-term debt in emerging markets is surprisingly small. An improving contractual environment in, inter alia, Latin America is one possible explanation for why we do not observe this short-term bias at present. It would also explain why we now observe more contract and institution-intensive flows, such as corporate long-term bonds and ADRs.

The nature of crises. Dooley (1997) provides a model in which moral hazard can explain the timing and dynamics of crises. His model runs off of a policy conflict between the desire of a credit-constrained government to hold reserve assets of a form of self-insurance and the government's inability to commit not to liquidate those assets in order to bail out domestic financial and nonfinancial firms. This policy creates incentives for investors to acquire insured claims on residents and then to exchange them en masse for the government's assets when yield differentials make this optimal. The slow but steady acquisition by foreigners of claims on residents has as its mirror image capital inflows. When the government's reserves are exactly matched by its contingent insurance liabilities, the yield on domestic liabilities falls below the market rate, and investors sell the insured assets to the government, exhausting its reserves. The timing of the attack is both determinate and explicable in terms of moral hazard. Whether Dooley's model provides an accurate explanation for events like the Asian crisis is, of course, a disputed question.

More generally, proponents of the moral-hazard view explain recent crises in terms of the large stock of short-term debt accumulated by crisis countries, reflecting the fact that the exchange-rate insurance implied by a policy of pegging the currency is most credible over short horizons. The single most robust leading indicator of currency and

financial crises is the share of short-term debt in a country's external liabilities and the portion of that debt that flows through the banking system in particular (Frankel and Rose 1997, Rodrik and Velasco 1999). This has led to recommendations that countries adopt Chilean-style holding-period taxes and analogous measures to limit their dependence on short-term borrowing.

The evidence linking short-term debt to crises is robust, and not just in econometric cross section: both the Mexican and East Asian crises erupted at moments when short-term liabilities exceeded liquid assets. But one should be cautious about strong assumptions regarding the direction of causality. If a country with a good debt profile and large reserves is suddenly rationed out of the market for reasons entirely independent of the maturity structure of its debt, its reserves will decline and it will have difficulty rolling over maturing long-term obligations. The short-term structure of the debt is a symptom, not the underlying cause of the crisis problem.[22]

The underlying cause, then, could be either original sin or the absence of an institutional environment conducive to credible commitments. Original sin suggests that a sudden reversal of capital flows, even if it occurs for reasons quite independent of the situation in a particular emerging market, can precipitate serious financial problems, due either to maturity mismatches, if the exchange rate is defended, or to currency mismatches, if it is not. Work by Eichengreen and Rose (1998), which finds a strong impact of U.S. interest rates on the likelihood of banking crises in emerging markets, quite independent of the situation in the emerging markets themselves is consistent with this view.

The idea that the inability of borrowers to make credible commitments also finds some support in the particulars of the Asian crisis. The tendency for the crisis to infect economies such as Indonesia's, as panicked creditors scrambled to attach the available collateral, is consistent with the view that such countries are especially crisis prone due to the weakness of creditor rights, of the judiciary, and of their bankruptcy and insolvency procedures.

The safe, if unexciting, conclusion is that no one of our three explanations alone can fully explain the facts.

Would a more flexible exchange rate encourage more hedging?

Accounts that explain the severity of the Asian crisis in terms of the extent of unhedged foreign exposures argue that these mismatches emerged out of "expectations that relatively stable exchange rates would be maintained indefinitely."[23] They advocate greater exchange rate flexibility as a way of giving banks and firms stronger incentives to hedge their positions.

In the original-sin interpretation, the problem is not that the private sector lacks incentives to hedge but that it lacks the capacity. If foreign investors are willing to lend only in their own currencies, then the country's aggregate net foreign exposure must be unhedged, by definition. To assume the ability to hedge is equivalent to assume that countries can borrow abroad in their own currencies but choose not to do so, in spite of the fact that the market does not appear to exist. If inadequate incentives are the reason for the failure to hedge, then we should see more foreign-currency borrowing in countries with floating currencies. In fact, this is not the case: floaters such as Chile, Mexico, and Peru do their borrowing in foreign currency. By contrast, developed countries borrow mainly in their own currency, whether their exchange rates float freely or not. This suggests that something besides inadequate incentives to hedge is at work.

The very idea that corporates should hedge the exposures that emanate from their foreign currency loans implies a curious division of labor. Borrowing in dollars and hedging the risk is equivalent to borrowing in pesos. Wouldn't it make more sense for international banks to offer peso loans and to themselves do the hedging?

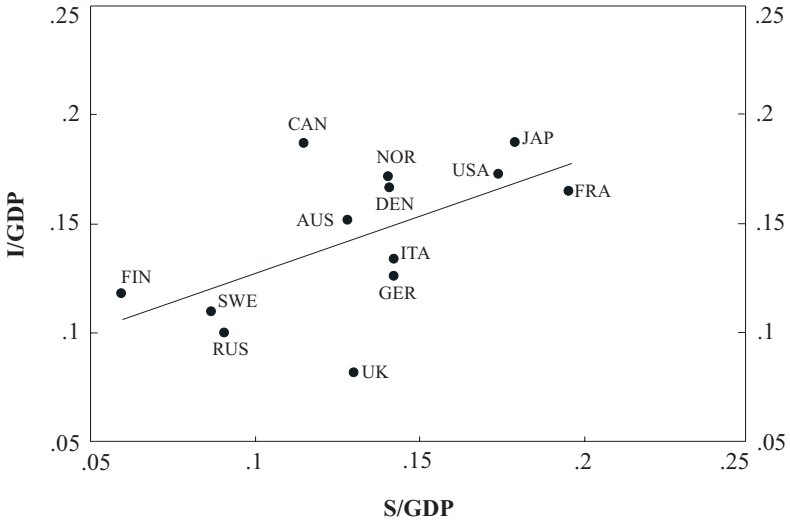
To be sure, even if the aggregate net foreign exposure of a country suffering from original sin must be unhedged, individual banks and firms can hedge their exposure by selling its domestic-currency-denominated liabilities for assets denominated in foreign currency, but only to other domestic banks and firms, since foreigners are

unwilling to buy those liabilities by assumption. They can pass their exposures around like a hot potato, but they cannot eliminate them. There is an argument that the redistribution of foreign exposures domestically can be stabilizing, either because it distributes them more evenly (avoiding unmanageable concentrations in a few corporate hands) or because it reallocates them from banks and firms less able to manage them to other domestic entities in a stronger position to absorb the impact of a large exchange-rate change on their balance sheets. But the extent to which this has important stabilizing effects remains an open question.

More fundamentally, the idea that floating, by increasing the volatility of the exchange rate, will lead to more hedging overlooks the fact that the cost of hedging increases with volatility. The exchange rate volatility associated with floating means that insurance will be more expensive, and that it may be optimal to leave a larger portion of dollar liabilities unhedged. In currency futures and options markets, volatility will aggravate uncertainty about whether the counterparty will be able to deliver on the contract. Markets in currency hedges are insurance markets, and, as in any insurance market, adverse selection can interfere with the tendency for the quantity of insurance to rise with the underlying risk. As the risks go up, it may pay to sell less. A possible implication is that one should observe more, not less hedging when exchange rates are stable. This may be why countries with very low exchange-rate volatility, such as Hong Kong and Argentina, have relatively deep forward markets.[24]

This is, as the theorists say, an empirical question. On the one hand, there is anecdotal evidence from Asia of unhedged exposures encouraged by "expectations that relatively stable exchange rates would be maintained indefinitely."[25] Analysts seem convinced that more volatility would have encouraged more hedging over the relevant range. On the other hand, there is the fact of relatively deep forward markets in countries such as Hong Kong and Argentina. The plural of anecdote may be data, but more than anecdotal evidence is needed to answer this question. In other words, gathering survey (and other) data on hedged and unhedged exposures and analyzing their determinants should be a high priority for academics and the multilaterals.

Chart 1
Savings and Investment Rates
(Expressed as Ratios of GDP)
1885-1913



Case-study evidence

Further light can be shed on these issues by three case studies: Argentina under the gold standard and Panama and Australia in the 1990s.

Argentina under the gold standard. Gold-standard experience, depending on how it is viewed, lends some support for each of our three interpretations of the financial-fragility problem. Capital flows, as is well known, were unusually large between 1880 and 1914. Chart 1 shows the now-famous scatter plot of savings and investment rates for high-income countries during the gold standard years.[26] This correlation is looser than in the modern period; the adjusted R^2 from a regression of savings on investment ranges from 0.15 to 0.30 depending on the sample period and number of observations, in contrast to 0.9 or more in Feldstein and Horioka (1980), indicative of a higher level of capital transfer under the gold standard. Net outflows ranged as high as 9 percent of GDP on an annual average basis for Britain and reached

somewhat lower peaks in France and Germany. Current account deficits exceeded 10 percent of GDP in Australia, Canada and Argentina for significant portions of the three decades preceding 1913. Much of this lending was long term, intermediated by the bond market. Because foreign funds were heavily devoted to railway construction, this relatively free bond-market access eliminated the modern problem of maturity mismatches.

Without doubt, the low level of exchange risk under the gold standard contributed to this unusual willingness to lend and ability to borrow. Madden (1985, p.255) observes that it is "of course common knowledge that British investors viewed securities issued by countries not on the gold standard as riskier than those of countries that were." In a statistical study, Bordo and Rockoff (1996) document that countries on the gold standard were able to borrow abroad at lower interest rates than those with fluctuating, inconvertible currencies.

The question is whether adherence to the gold standard was the real story behind this exceptional level of capital transfer—or, to put the point another way, what Bordo et al.'s gold-standard variable is picking up. Many of the countries that loomed large on the receiving end of capital flows in the high gold standard era (Canada, Australia, New Zealand, India) were members of the British Empire. They imported the British legal system. They imported British auditing and accounting standards, typically in the person of the expatriate British chartered accountant. They were dependent on the British market for their exports, which, together with their political ties to the mother country, rendered debt default virtually unthinkable. They possessed a relatively strong financial infrastructure, in other words, and a commitment technology that lent credibility to the promise to repay. These facts, and not the internationalization of currencies per se, may explain their extraordinary capital-market access.

To be sure, there were exceptions such as Argentina. While the British export market loomed large there too, few of the other aforementioned conditions prevailed. Yet, Argentina was able, nonetheless, to access large amounts of foreign capital while on the gold standard, notably in the 1880s. This is a clear suggestion of the importance of the

exchange-rate regime, consistent with the predictions of "original sin."

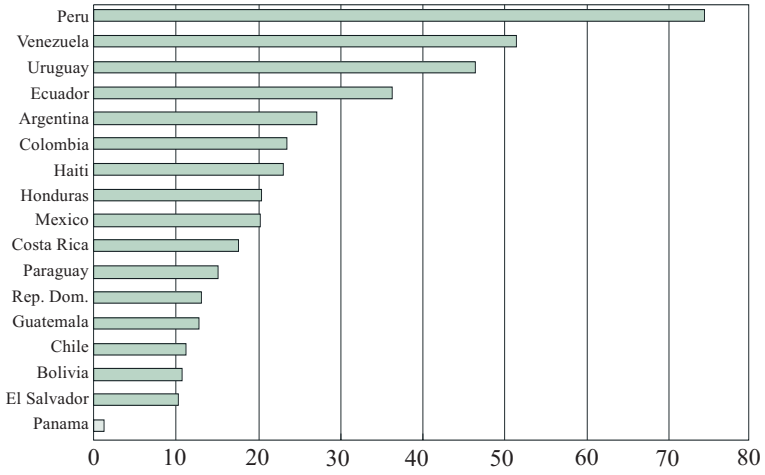
At the same time, Argentina's experience under the gold standard was not entirely happy.[27] The 1880s, the decade of large-scale capital imports, was riddled with fiscal and financial excesses. The country had a weak banking system. Connected lending was pervasive. Disclosure standards were weak, transparency inadequate.[28] The government pressed the banks to finance its deficits and underwrite its development plans, in return for which it extended them implicit promises of support. All this will sound familiar to adherents to the moral-hazard view.

The denouement in 1890 involved the suspension and restructuring of debt-service payments. The gold premium skyrocketed. Argentina was then mired in recession until the second half of the decade. Railroad construction ground to a halt as capital market access was curtailed. Argentina's access to European capital markets was not restored for a decade, until the gold standard was reinstituted in 1899 and full debt service payments were resumed in 1901.

An interpretation is that internationalization of the currency under the gold standard was no panacea, and that happy results hinged on putting in place other supportive policies, such as fiscal discipline, a strong banking system, arms-length lending, and adequate disclosure and transparency. This reading of history suggests that dollarization is bound to produce happy results only if it is adopted in the context of a sound policy framework.

Panama. A second relevant case is Panama, a fully dollarized economy with an internationally integrated financial system. Dollarization is of long standing. Based on a 1904 agreement with the United States, which led to adoption of Panamanian Law no. 84 that same year, Panama has no paper currency of its own.[29] The U.S. dollar circulates as legal tender, along with U.S. and Panamanian coins.[30] The National Bank serves as clearinghouse for checks and dollars but has no effective control of the money supply.

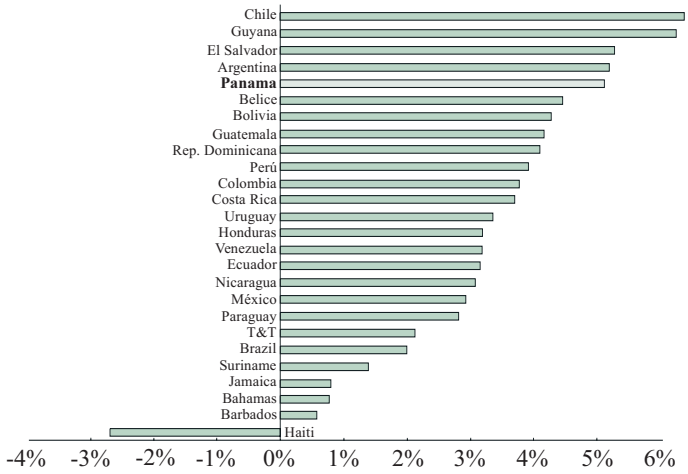
Chart 2
Average CPI Inflation in Panama and Other Latin American Countires
1990-1998



Panama's experience would appear to provide clear evidence of the benefits of internationalization of the currency. The country has had, by far, the lowest rate of inflation in Latin America, averaging less than 1 percent in the 1990s (Chart 2). At 4.3 percent, it has had the second fastest rate of growth in Latin America after Chile and the second lowest GDP volatility behind Colombia (Chart 3). Capital inflows are large and smoothly finance payments imbalances. Panama's Brady Bonds are less volatile than those of any other Latin American country (Chart 4), and those bond-price fluctuations have the least impact on domestic financial conditions.[31]

Interestingly, Panama's fiscal performance has been less than virtuous. It suffered significant political disturbances as well, in 1964, with riots in the Canal Zone, and again in 1987-89, when the United States imposed a trade embargo, stopped payments for the Canal, and froze the assets of the National Bank of Panama. And yet, its banking sys-

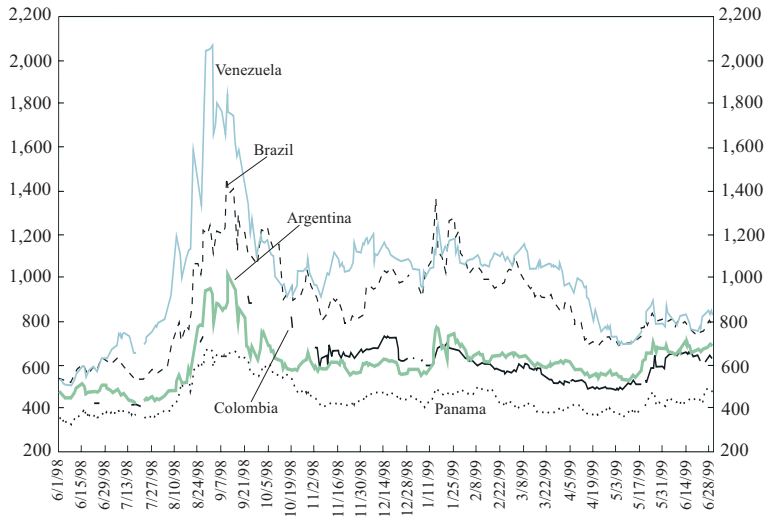
Chart 3
GDP Growth in Panama and Other Latin American and Caribbean Countries
1990-1998



tem held up through those events as well as through the two oil-price shocks, the lending boom of the 1970s, and then the debt crisis of the 1980s (Moreno-Villalaz 1999). The country's banking system is exceptionally large for a country of its size and income, bank credit to the private sector exceeding 100 percent of GDP. Panama has the highest ratio of M2 to GNP of any Latin American country (Chart 5). And it is the only economy in Latin America with an active 30-year mortgage market, which offers loans at twice the typical Latin American maturity at rates under 9 percent, roughly half those on the average Latin American dollar mortgage.

These are compelling benefits. But are they attributable to dollarization? A problem with this attribution is that the growth of Panama's financial sector and the development of an active 30-year mortgage market did not coincide with dollarization but post-dated it by sixty years. The growth of the Panamanian banking sector only

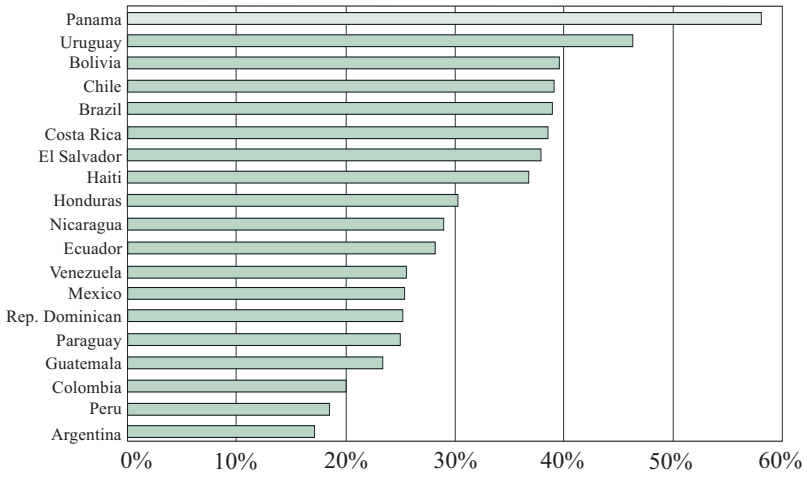
Chart 4
Long-Term Bond Spreads for Selected Latin American Countries
1998-1999



began following the adoption of Law No. 18 of 1959, which enhanced secrecy and opened the way for numbered bank accounts. Cabinet Decree No. 238 of 1970 then reorganized the country's banking system, adding flexibility in bank licensing and further strengthening secrecy provisions to lure foreign banks to Panama. This made Panama attractive as an offshore banking center. The irony then, is that the financial depth and stability of the Panamanian financial system is not associated with the transparency and good practices that dollarization is supposed to bring, but precisely with the country's lack of transparency.

Be that as it may, the presence of a large financial sector permitted full integration of the Panamanian domestic market into the U.S. financial system. Banks in Panama can place their excess deposits in the Libor market and borrow quite freely there when credit demand

Chart 5
M2/GDP Ratio in Selected Latin American Countries: Average for the 1990s



exceeds deposit demand. This has allowed the financial sector to cushion the economy from many of the major external shocks of the last thirty years.

Thus, Panama shows that, although dollarization may provide price stability, reaping its full benefits also requires fully integrating the domestic financial system into international financial markets.

Australia. Highly open, primary-commodity-exporting countries, according to the conventional wisdom, find it difficult to float. Australia is an important counterexample. The Asian crisis showed the effectiveness of Australia's flexible exchange rate regime. The country, which started floating in 1983, spent more than a decade struggling with its new system. Oftentimes, monetary policy had to be used to support the exchange rate, leading in the early 1990s to a procyclical response to shocks that produced a major recession. But credibility was established in time to be put to use during the Asian crisis.[32]

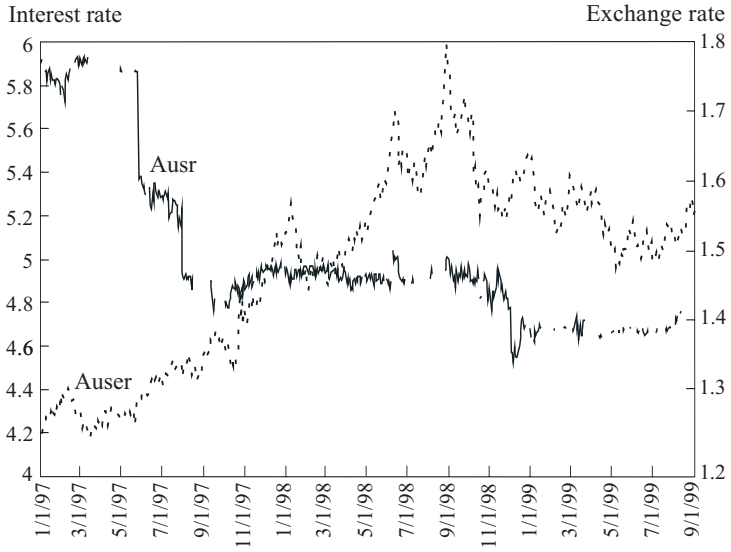
Australia was hit by a terms-of-trade decline of about 10 percent as a result of the crisis. Policy-makers decided to let the exchange rate take the hit and did not raise interest rates, easing instead. The relaxation of monetary policy stimulated a consumption boom that sustained expansion at more than 4 percent per annum. The currency depreciated by 20 percent vis-a-vis the U.S. dollar.[33] This depreciation had little effect on inflation, which remained subdued at less than 2 percent, the central bank's target rate. It compensated for the collapse of import prices, preventing deflation and boosting the profitability of the export sector. Nonetheless, the current account deficit widened from 4 to 6 percent of GDP.

So much for "fear of floating." The question is whether Australia's success with floating can be emulated by emerging markets. Many Latin American economies share the population size and resource intensity of Australia. But does exchange rate flexibility promise similar results there?

The reason for thinking not is that Australia does not suffer from original sin. It possesses a deep and liquid long-term, domestic-currency, fixed-interest-rate market. Some 44 percent of its external debt is denominated in its own currency. Not only are Australian companies able to issue A$-denominated bonds in international markets, but non-Australian global firms issue such obligations as part of a balanced funding strategy. Much of that debt is swapped with Australian firms to further reduce Australia's foreign currency exposure.

Analysts (e.g. Gruen and Kortian 1996) argue that Australian bonds are attractive because the A$ strengthens when commodity prices are high, reflecting the country's resource intensity. This typically coincides with periods in which global inflation is high. Australian bonds are, therefore, perceived as providing an inflation hedge. Because Australia's foreign debt is mainly denominated in $A, depreciation works to reduce the domestic value of foreign debt instead of increasing it. By floating, Australia is effectively able to transfer some of its risk abroad. In contrast, if a country suffers from original sin and its external debt is denominated in foreign currency, a weakening currency will have adverse balance-sheet effects. If it devalues it may

Chart 6
Australian Exchange Rates and Interest Rates
1997-1999

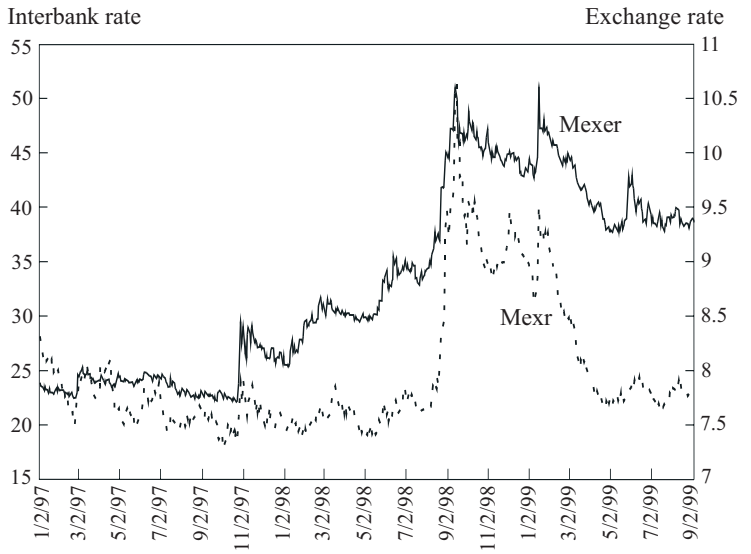


therefore be perceived as less credit worthy, forcing it to reduce instead of widening its current account deficit. Instead of the anti-cyclical policy Australia is able to pursue, such a country would have no choice but to adopt a procyclical policy.

This contrast is evident in Charts 6 and 7, which compare interest-rate and exchange-rate behavior in Australia and Mexico. In Australia, it has evidently been possible for the authorities to decouple exchange-rate and interest-rate policies so as to operate in countercyclical ways. In Mexico, in contrast, the interest rate continues to shadow the exchange rate, reflecting the authorities' reluctance to allow the latter to move freely, given the extent of currency and maturity mismatches in the banking system. There, the active countercyclical use of monetary policy is necessarily more limited.

Australian experience thus underscores the importance of original sin. But how did Australia achieve redemption? One answer is that the

Chart 7
Mexican Exchange Rates and Interest Rates
1997-1999



country developed its market for long-term debt before it liberalized its financial markets and before it started to float in 1983. The bond market became attractive to foreign investors only after a liquid domestic market had first been developed. Moreover, Australia started to float not in the context of a currency crisis but in the context of an appreciation.

This path may be hard to follow for countries that have already liberalized their financial systems and begun to float. And, in turn, this suggests that dollarization may act as a scaffolding that allows markets to develop.

Conclusion

There are no easy solutions for countries confronted by the exchange-rate dilemma. It is a commonplace of international economics textbooks that pegged exchange rates, international capital mobil-

ity, and an independent stabilizing role for domestic monetary policy are incompatible. In a recent paper, Richard Cooper (1999) has also questioned whether floating exchange rates, international capital mobility, and an independent stabilizing role for domestic monetary policy are compatible. In a world of high capital mobility, the textbooks teach, countries seeking economic and financial stability cannot peg. But neither, recent experience as interpreted by Cooper and the apostles of original sin suggests, can they safely float.

This leaves two ways out. One is dollarizing. Dollarization eliminates all scope for an independent national monetary policy and is likely to limit the capacity of the domestic authorities to provide lender-of-last resort services.[34] But by eliminating the currency and maturity mismatches that are a particular threat to financial stability, it diminishes the need for either function of monetary policy. By increasing the willingness of foreigners to lend, especially in periods when lending is needed most, dollarization promises to reduce the level and volatility of interest rates, attenuate the severity of business cycles, and buttress the stability of financial systems in emerging markets. The caveat is that if dollarization proceeds before other risks to financial stability have been reduced by, inter alia, reinforcing capital standards, strengthening prudential supervision and regulation, and putting the public finances on a sound and stable footing, premature removal of part of the safety net may come back to haunt the authorities.

The other way out is to become more like Australia. Countries can shed their fear of floating by achieving redemption from original sin—by building deep and liquid domestic markets in long-term, domestic-currency-denominated securities. Doing so means adopting securities-market regulations that discourage insider trading, market cornering, and market manipulation in order to make participation attractive to investors. It means reforming monetary and fiscal institutions in ways that enhance the independence, transparency, and credibility of the policy-making authorities, and acquiring a track record of following sound and stable policies. It means privatizing social security systems to generate a broad constituency of domestic investors opposed to the manipulation by sovereigns of domestic debt markets.

The problem, the advocates of dollarization object, is that emerging markets cannot afford to wait. The cost of postponing growth and stability is very large. These are sorely needed now, not tomorrow or the day after. Indeed, becoming like Australia may be even trickier and take even longer than this. Australia developed its long-term domestic market before it liberalized its financial system and started to float. Building a demand long-term, domestic-currency-denominated securities may be even harder in today's world of liberalized financial markets and floating exchange rates. The extent of reform in emerging markets (IDB 1997) suggests that it may now be the monetary regime that is the lagging component.[35]

Time will tell which of these options proves more appealing to emerging markets. Only one thing is sure: we are about to find out. Let us hope that it will not take too many more devastating crises to see the issues more clearly.

Authors' note: The views expressed are those of the authors and not necessarily those of the Inter-American Development Bank or its board of directors. For financial support, Barry Eichengreen thanks the Ford Foundation, through the Berkeley Project on International Financial Architecture.

Endnotes

[1] This emphasis is apparent in the three G22 reports on strengthening the international financial architecture (G22 1998a, b, c), which were the official community's definitive word on the subject circa 1998.

[2] Drage and Mann (1999) and Frankel (1999) are representative of many examples that could be cited.

[3] For ease of exposition, in what follows we refer to this as dollarization.

[4] Assuming no subsequent desire to return to the market and/or no reputational effects. To be sure, these are not inconsequential assumptions. They are adopted here for expository convenience only. We discuss the implications of relaxing them in what follows.

[5] Central bank inspections of financial institutions actually fell from 23 to 10 percent during the four years leading up to the crisis, allowing the share of problem loans in bank portfolios to rise fivefold. See also Bisat, Johnston, and Sundararajan (1999).

[6] See e.g. Rubin (1999).

[7] Early influential statements of this view included Goldstein (1997), Dooley (1997), Krugman (1998), and Corsetti, Pesenti, and Roubini (1998). Burnside, Eichenbaum and Rebelo (1999) develop a theoretical model that derives these conclusions. In the absence of government guarantees, they show, it is optimal for banks to hedge exchange risk in forward markets, since banks incur the loss of sunk costs in the event of devaluation-induced bankruptcy. But the presence of government guarantees completely eliminates the incentives to hedge the risk of a devaluation. Instead, it may be optimal for banks to further magnify their exchange exposure, since they reap additional returns in the event of no devaluation but get bailed out if the exchange rate changes. This result, that hedging is more prevalent when exchange-rate flexibility is greater, is derived from some very special assumptions. (Below, we argue that this result may well not obtain in the more general case.) Specifically, the authors assume the presence of moral hazard in the credit market but no distortion in the market for hedges, whose supply side is not modeled. Assuming that the rest of the world is willing to supply currency hedges is equivalent to assuming that a country is able to borrow abroad in its own currency. Below, we challenge the realism of this assumption.

[8] This is not to deny that there was a role for other factors, such as the maintenance in Korea of restrictions on other forms of inward foreign investment, and Thailand's establishment of the Bangkok International Banking Facility.

[9] BIS data rely on reports from major OECD banks, while IFS makes use of reports from non-OECD countries that are borrowing funds. Both suggest that about 30 percent of this lending was denominated in yen, while most of the remainder was denominated in dollars. BIS (1998), p.123.

[10] In the IMF version, Indonesia, Korea, and Thailand quite actively pursued either nominal or real exchange rate targets "....while orienting interest rates toward internal stability objectives. This...encouraged capital inflows that were substantially short term in nature, and in particular in the form of foreign currency borrowing. Such borrowing was largely unhedged because of expectations that relatively stable exchange rates would

be maintained indefinitely." Or, in the BIS version, "long-standing policies of fixed or quasi-fixed exchange rates probably nurtured a misperception of exchange rate risk. With a flexible exchange rate, and frequent movements in both directions, firms and households learn from their daily experience to take account of exchange rate risk. But when many years of nominal stability...are followed by a large, discrete shift, the danger that private agents will be caught unprepared is much greater" (BIS 1999, p.124).

[11] A problem modeled formally, in its variants, by Chang and Velasco (1999).

[12] Note that this dynamic can take place under floating as well as a discrete devaluation, as happened in Indonesia at the time of its final collapse.

[13] Hausmann et al. (1999) estimate that Latin American countries with floating currencies have financial systems 15 to 30 percent smaller than they otherwise would have been.

[14] Real interest rates in Latin American countries with floating exchange rates have averaged 9 percent in the 1990s, compared to 5 percent for Latins with fixed rates. In addition, domestic interest rates have been more sensitive to foreign rates under floating rather than fixed regimes, implying less, not more, monetary autonomy. When the cost of foreign borrowing rises by 1 percent, domestic interest rates have risen on average by 1.4 percent under Argentina's currency board but by 5.9 percent under Mexico's floating regime (Hausmann et al. 1999). Frankel (1999) also finds that domestic interest rates are more sensitive to the U.S. federal funds rate in floating rate than fixed-rate countries.

[15] This mechanism would explain why Latin America remains highly dollarized even after a decade of low inflation.

[16] See inter alia Greenwald, Stiglitz, and Weiss (1984).

[17] Cooper and Sachs (1984) provide an early theoretical statement. Fernandez-Arias and Lombardo (1998) present an up-to-date model in which sovereign risk leads to over-borrowing, followed by a crisis.

[18] A point made famous by our discussant; see Feldstein and Horioka (1980).

[19] The first contrast is sharpest in Latin America, where only 24 percent flows through banks while almost 56 percent goes through non-banks. One could object that developed countries have better developed banking systems, but in fact it is securities markets, not banking systems, that are especially late to develop, given their relatively demanding information and regulatory requirements (Levine 1997). This bias goes in the wrong direction to rescue the moral-hazard hypothesis.

[20] This does not mean that total short-term debt was the same across all regions, since the BIS reporting banks do not represent the same proportion of external debt in different countries.

[21] Although Mexico and its tesobonos can be invoked as a counterexample. That said, the growing volume of foreign equity investment raises doubts about the relevance of this example for the future.

[22] Latin America is a case in point. After the Tequila crisis, governments and corporations paid special attention to lengthening the maturity of their obligations and monitor-

ing the relationship between short-term assets and liabilities. As shown in Table 5, short-term debt in the region has averaged 26 percent of total liabilities, or about half East Asia's level. It is particularly low in Argentina and Brazil. But this did not permit Latin American countries to maintain market access and cushion their economies by borrowing when they were hit by negative terms of trade shocks. As capital inflows dwindled, they were forced into contractionary adjustments designed to increase the trade surplus, this at a time when the world market prices of their exports were collapsing. Limiting their dependence on short-term debt may have allowed Latin American countries to avoid sudden exchange rate collapses, but it has not made financial markets less volatile. In fact, long-term markets have shown incredible volatility (Chart 2): yields on Latin American dollar-denominated bonds have been ten times more volatile than equivalent U.S. bonds in the 1990s. This implies that something more than just short-term bias caused by moral hazard is at work.

[23] The quote is from Johnston, Darbar, and Echeverria (1999), p.290.

[24] In addition, promoting futures markets in poorly regulated and supervised financial systems has a downside. Derivatives are among the hardest instruments to regulate. While they can be used to hedge risks, they also permit to place highly speculative bets hidden off balance sheet. The development of options markets may be particularly dangerous in countries with weak banking supervision.

[25] The quote is from Johnston, Darbar, and Echeverria (1999), p.290.

[26] This uses the Jones and Obstfeld (1999) data set.

[27] Readers interested in more detail might consult Marichal (1989).

[28] See Peters (1934) and Schwartz (1989) for two accounts.

[29] The initial purpose of this agreement was to ease the process of paying workers engaged in building the Panama Canal, although it remained in place subsequently.

[30] For a brief period in 1941, the Panamanian President (Arnulfo Arias Madrid) created a central bank, which emitted one, five, ten and twenty balboa notes, but when Arias was deposed later that year, the notes were invalidated and withdrawn from circulation.

[31] Stein et al. (1999) estimate the elasticity of short-term domestic interest rates with respect to the yield on long-term dollar bonds and find large and statistically significant responses for six other Latin American countries but not for Panama, where the short-term interest rate is essentially determined by Libor.

[32] The first decade of floating was not easy. It involved paying spreads of about 400 basis points over U.S. treasuries until the early 1990s, when both inflation and interest rates started to converge to U.S. levels. Until then, it involved setting monetary policy with the exchange rate in mind.

[33] But by only 10 percent in trade weighted terms.

[34] Ability to act as a lender of last resort is not exclusively based on the capacity of the central bank to print money, of course, but instead on the capacity of the public sector to supply or borrow real resources in times of crisis. If this cannot be done in other ways, the ability of the central bank to use fiat money to backstop the financial system must be

relied upon. However, since this tends to signal an acceleration of inflation, there is the risk that it can generate an attack on the currency (Chang and Velasco 1999). Argentina in 1982, Venezuela in 1994, and Ecuador in 1999 are cases in point.

[35] In Latin America, for example, countries have gone a long ways in strengthening their fiscal positions, internationalizing their banking systems, and upgrading the supervision and regulation of their financial markets, especially after the Tequila crisis of 1995. In addition, they have improved their international liquidity position and debt structure. Thanks to these reforms the region was able to withstand a series of large negative shocks starting in the second half of 1997 (the Asian crisis, the collapse in the terms of trade, El Nino, the Russian crisis, the Brazilian contraction and devaluation, etc.). Its banking systems were able to survive a very large decline in capital inflows and a sharp drop in economic activity. It may, therefore, be that further strengthening domestic systems to cope with the consequences of original sin is a less efficient response than dollarization.

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