SHORT-TERM CAPITAL FLOWS

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ABSTRACT

We provide a conceptual and empirical framework for evaluating the effects of short-term capital flows. A simple model of the joint determination of the maturity and cost of external borrowing highlights the role played by self-fulfilling crises. The model also specifies the circumstances under which short-term debt accumulation is socially excessive. The empirical analysis shows that the short-term debt to reserves ratio is a robust predictor of financial crises, and that greater short-term exposure is associated with more severe crises when capital flows reverse. Higher levels of M2/GDP and per-capita income are associated with shorter-term maturities of external debt. The level of international trade does not seem to have any relationship with levels of short-term indebtedness, which suggests that trade credit plays an insignificant role in driving short-term capital flows. Our policy analysis focuses on ways in which potential illiquidity can be avoided

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1 Introduction

Almost all of the countries affected by the financial turmoil of the last few years had one thing in common: large ratios of short-term foreign debt, whether public or private, to international reserves. In Mexico in 1995, Russia in 1998, and Brazil in 1999, the debt was the government's; in Indonesia, Korea, and Thailand in 1997, the debt was primarily owed by private banks and firms. But in each case the combination of large short-term liabilities and relatively scarce internationally liquid assets resulted in extreme vulnerability to a confidence crisis and a reversal of capital flows.

When the capital account reversal came in East Asia, it caused a collapse in asset prices and exchange rates. The financial panic fed on itself, causing foreign creditors to call in loans and depositors to withdraw funds from banks, all of which magnified the illiquidity of the domestic financial system and forced yet another round of costly asset liquidation and price deflation. In Thailand, Korea and Indonesia, domestic financial institutions (and in Indonesia non-financial firms) came to the brink of default on their external short-term obligations. For Korea and Thailand, default was prevented by an emergency rescheduling of liabilities. Indonesia had to declare an effective moratorium on debt service by its corporate sector in January 1998. The output cost of this liquidity crisis has been tremendous.

There is growing agreement that an excessive buildup of short-term debt was a proximate cause of the recent crises, particularly in East Asia. Different accounts place varying weights on a host of factors —corruption and cronyism, lack of transparency, misguided investment subsidies and loan guarantees, poor financial regulation, real exchange rate misalignment, large external deficits, fixed exchange rates that were maintained for too long, etc. But few analysts doubt that the large exposure to short term debt left East Asian countries vulnerable to sudden changes in market sentiment and financial panic.[1] Indeed, Furman and Stiglitz (1998) write: "The ability of this variable, by itself, to predict the crises of 1997, is remarkable."

In spite of this quickly spreading consensus, we have relatively little theoretical and empirical work linking short-term debt, vulnerability, and crises. In this paper we attempt to make some progress on both fronts. On the theory front, we build an extremely stylized model of how excessive short term debt can leave borrowing countries vulnerable to sudden shifts in lender expectations, which can in turn become self-fulfilling. Banks, firms and governments often justify their tendency to borrow short term "because it is cheaper." However, the

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[1]See Furman and Stiglitz 1998; Radelet and Sachs 1998; and Corsetti et al 1998a.

term structure of interest rates is determined by the riskiness of different debt maturities, and these should in turn reflect the possibility of a crisis associated with illiquid portfolios. Consequently, the role of short term debt in generating a crisis can only be analyzed in a model of the simultaneous determination of debt maturity and the term structure of interest rates. We build such a model, and find that the share of short-term debt that is desirable *ex ante* depends on a host of factors, such as the extent to which early investment liquidation is costly, the probability that a run on short-term debt will take place if one is possible (something that depends among other things on the borrowing country's previous credit record), and the likelihood and costliness of attempted debt defaults. At the same time, there is a host of plausible distortions that could lead local borrowers to prefer short term loans beyond the level that is socially desirable.

We also undertake an empirical analysis of the consequences and causes of short term foreign debt. Using data from the Institute of International Finance, covering 32 emerging-market economies over the period 1988-1998, our analysis shows that the ratio of short-term debt to reserves is a robust predictor of financial crises. Countries with short-term liabilities to foreign banks that exceed reserves are three times more likely to experience a sudden and massive reversal in capital flows. Furthermore, greater short-term exposure is associated with more severe crises when capital flows reverse. We also find that shorter-term maturities of external debt are associated with higher levels of M2/GDP and per-capita income. Interestingly, the volume of international trade does not seem to have any relationship to the level of short-term indebtedness, which suggests that trade credit has played an insignificant role in driving short-term capital flows during the 1990s.

Both theory and empirics, then, suggest that one has to keep an alert eye on debt composition and on the ratio of short term liabilities to available liquid assets. We ask in section 5 below whether there is a strong case for discouraging short-term inflows during the upswing in the cycle. Substantial evidence suggests that controls (of very different kinds) applied by countries such as Chile, Colombia and Malaysia altered the maturity composition of loans from abroad without —at least in the South American cases— reducing the overall volume of flows. Lengthening of average maturities, as both our theoretical and empirical results show, can reduce vulnerability to crises. Yet restraining short-term borrowing involves no free lunch, since in some circumstances both governments and private borrowers may have perfectly sound reasons for wanting to take on some short-term liabilities.

Our analysis has implications not just for crisis prevention, but also for crisis management. Traditional, current account-driven currency crises typically required a real depreciation and

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a contraction of demand; illiquidity-driven crises may call for different answers. The emphasis should be on preventing the coordination failure that causes lenders to head for the exits. Negotiated debt rollovers and temporary suspensions of payments can make all parties better off. In the parlance of recent policy debates, "bailing in" foreign lenders is preferable from an efficiency standpoint to "bailing out". Multilateral lenders have a role to play in helping arrange such coordinated outcomes, while at the same time monitoring borrowers to prevent moral hazard. We provide more specifics in the last section of the paper.

2   An overview of short-term capital flows in the 1990s

The 1990s were a boom period for international lending. The outstanding stock of debt of emerging-market economies roughly doubled between 1988 and 1997, from $1 trillion to $2 trillion.[2] While medium- and long-term debt grew rapidly as well, it was short-term debt that rose particularly rapidly during this period.

As Figure 1 shows, the debt build-up was concentrated in Latin America and Asia. Latin America experienced rapid growth in external indebtedness until 1994, at which point the tequila crisis slowed down capital flows significantly. One consequence of the tequila crisis was that East Asia and Latin America began to diverge in their debt profiles. In Latin America, the short-term debt stock stopped growing and stabilized at its 1994 level. But in East Asia, short-term debt continued to grow, if anything, at a faster rate. The two regions look quite different in terms of the role played by short-term lending by commercial banks. As the bottom panel of Figure 1 reveals, short-term foreign liabilities to commercial banks exploded in East Asia during the 1990s, while they played a much smaller role in Latin America throughout the decade. One reason is that commercial banks had been burned in Latin America the previous decade.

Table 1 provides information on the maturity composition of debt by region. The difference between Latin America and Asia is striking. By the beginning of 1997, Asia was the region with the highest ratio of short-term debt in total. The proportion of short-term debt owed to banks in Asia was significantly higher than any other region, and double the level in Latin America (29 percent of total debt versus 15 percent in Latin America).

Regional averages hide a lot of detail, and clearly not all of the Asian countries binged on short-term capital inflows. Figure 2 shows the pattern for the five Asian countries worst

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[2]The group covers 10 countries in Latin America, 8 in Asia, 8 in Europe, and 11 in the Middle East and North Africa. Unless otherwise noted, all debt statistics in this paper come from IIF, 1998.

affected by the 1997 crisis (Indonesia, Malaysia, Philippines, South Korea, and Thailand). Short-term debt is shown in relation to reserves, a key measure of potential illiquidity as we discuss at greater length later on. Among the five countries, only Malaysia had a ratio of short-term debt to reserves of less than one. South Korea and Indonesia in particular had built up large amounts of short-term debt in relation to their reserves (with the ratio in Korea exceeding 3 by the end of 1997), leaving themselves vulnerable to self-fulfilling confidence crises.

3   A simple model of short-term debt

These data seem to suggest that Asian borrowers recently took on "too much" short-term debt abroad. But what is "too much" or "too little"? How should borrowers determine the maturity profile of their foreign debt? Here is a model that can help answer such questions.[3]

Imagine a small open economy populated by a representative investor-consumer who lives for three periods: 0 (the planning period), 1 and 2. She has access to the following fixed-size investment project: investing k units of the single tradeable good in period 0 yields Rk units of the good in period 2, where $R > 1$. But the project is illiquid, in the sense that if an amount of size $\ell \leq k$ is "liquidated" in period 1, it only yields $\rho\ell$ units, where $\rho < 1$.

To finance the project the local investor can borrow abroad, where the riskless world interest rate is zero. Foreign lenders are risk neutral, and willing to lend in two maturities: short term (ST) loans which last one period, and long-term (LT) loans, which last two periods. Assume also that all foreign lending must be collateralized by capital holdings: the investor cannot borrow more than k in period 0, and her total principal debt cannot exceed the size of the residual investment (the portion not liquidated) in any subsequent period.

Suppose that in period 0 the investor takes on an amount $d \leq k$ of ST debt, and an amount $k - d$ of LT debt. Whenever $d > 0$, lenders may choose not to roll over this ST debt in period 1. If that happens, we say that a "run" on ST debt has taken place.

Consumption takes place in period 2 only. At that point the investor collects the proceeds of the investment, pays whatever portion of the initial loan was not repaid in period 1, and then consumes. To keep matters manageable, assume that utility is linear in consumption.

We have described the model as being applicable to private debt only. But there are

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[3]Chang and Velasco (1998, 1999a and b) have also discussed the role of debt maturity in generating self-fulfilling crises. Obstfeld (1994), Calvo (1995), and Cole and Kehoe (1996) focus on short-term government debt, but without endogenizing the choice of maturity.

plausible interpretations that make this a model of public debt as well. Imagine, for instance, that private local investors have limited access to international capital markets, and that the government optimally borrows abroad "on their behalf" and then relends the funds domestically. In that case, a run on ST would prompt the government to demand early repayment from domestic borrowers (or, equivalently, to raise taxes), again causing costly liquidation of the local investment projects.

3.1   The potential for self-fulfilling debt runs

This very simple setup has all the ingredients necessary for multiple equilibria: liquid liabilities, illiquid assets, and hence the potential for a liquidity crunch caused by self-fulfilling expectations. To see that most simply, take the amount d of short term debt as exogenous (we will endogenize it below). Suppose also that the investor is charged the world real interest rate of zero on both LT and ST loans.[4]

What are possible outcomes? Clearly there is an "optimistic" equilibrium in which lenders roll over the loans d in period 1, so that none of the investment needs to be liquidated in that period. The investor has income of Rk in period 2, and debts of $d + (k - d) = k$. She repays in full, and consumes $(R - 1) k$.

But unless d is very small, that is not the only possible outcome. Suppose that in period 1 lenders call in their loans, anticipating that if they rolled them over they would not be repaid in period 2. When and how does this pessimistic expectation turn out to be self-fulfilling? With no roll-over, the investor has to liquidate $\ell = \frac{d}{\rho}$ in order to service ST debts in period 1. This means that in period 2 she will only have income of $R\left(k - \frac{d}{\rho}\right)$, and debts of $(k - d)$. If the latter quantity is larger (something that requires $d > \left(\frac{R-1}{R-\rho}\right)\rho k$), then the investor will not have sufficient resources to repay holders of LT debt, and the holders of ST debt will be happy they ran and got out in period 1. The domestic firm will be bankrupted, leaving unpaid debts and no profits behind.

This second outcome is clearly welfare inferior for all involved. LT lenders are not fully repaid. And the investor consumes nothing, in contrast with the positive consumption level she had in the optimistic equilibrium. Hence runs on ST debt have real effects, and those in turn can have important welfare consequences.

Of course, the physical liquidation cost in the model is simply a metaphor for the many costs that are associated with illiquidity and the associated macroeconomic disarray: projects

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[4]This is rational on the part of lenders if the possibility of runs is zero or very close to zero. See below.

can be left unfinished and depreciate very quickly, the scarcity of working capital may effectively paralyze ongoing ventures, and sharp swings in demand and relative prices can bankrupt otherwise viable enterprises overnight. All of these have been present in the recent liquidity crises in a number of emerging markets.

3.2 The term structure of interest rates

How is d determined? Our initial conjecture was that the relative cost of ST and LT loans should matter for this choice. But, in turn, contractual interest rates can only deviate from the zero world rate if loans to this country are risky, in that runs and crises happen with positive probability.[5] To keep matters simple, assume that with probability p foreign lenders panic and refuse to roll over outstanding loans in period 1; one can think of this as a generalized panic which becomes self-fulfilling. With probability $1 - p$, on the other hand, lenders remain calm and do agree to a roll over (not necessarily at the same interest rate as before). Assume, finally, that the illiquid technology is sufficiently productive, in that $R(1 - p) > 1$.

The basic question we are interested in is: how are the two interest rates, the maturity profile of the debt, and the vulnerability of this economy to runs and sudden capital outflows *jointly* determined? The interest rates r_S and r_L depend on the size of d. There are two cases to consider.

Suppose first $d \leq \rho k$ and conjecture that $r_S = 0$. If there is a run in period 1, then total claims on the investor are d, and maximum potential liquid assets are ρk, so that there is always enough to service ST debt in the event of a run. Hence, ST debt carries the world riskless interest rate, and $r_S = 0$. What about the LT interest rate? If d is very small ($d \leq \left(\frac{R-1}{R-\rho}\right)\rho k$), then the investor can fully repay her LT obligations in period 2 even in the event of a run in period 1. Then, $r_L = 0$ as well. If d is larger ($\left(\frac{R-1}{R-\rho}\right)\rho k < d \leq \rho k$), then the LT interest rate is given by the requirement that the expected return on this loan equal the world rate:

$$(1 - p)(1 + r_L) + pq_L(1 + r_L) = 1, \tag{1}$$

where q is the probability of being repaid in the event of a run, which we assume is equal to

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[5]Note that here loans can be risky even if the principal of the initial loan is fully collateralized. There are two reasons for that. First, liquidating domestic capital is costly, so that resources available in period 1 are less than the k initially borrowed. Second, the local investor must pay interest and not just principal.

the ratio of available resources to claims:

$$q_L = \frac{R\left(k - \frac{d}{\rho}\right)}{(1 + r_L)(k - d)} \tag{2}$$

Combining 1 and 2 we have that the LT interest is given by

$$1 + r_L = \left(\frac{1}{1 - p}\right)\left[1 - \frac{pR\left(k - \frac{d}{\rho}\right)}{k - d}\right] > 1 \tag{3}$$

Consider now the case of $d > \rho k$. Clearly not all ST debt can be repaid in the event of a run. Hence $r_S > 0$, and this interest rate is determined by

$$(1 - p)(1 + r_S) + pq_S(1 + r_S) = 1, \tag{4}$$

The probability of being repaid in period 1 is now

$$q_S = \frac{\rho k}{(1 + r_S)d} \tag{5}$$

Combining 4 and 5 we find that

$$1 + r_S = \left(\frac{1}{1 - p}\right)\left[1 - \frac{p\rho k}{d}\right] > 1 \tag{6}$$

In addition, since in a run all liquid resources are spent servicing ST claimants in period 1, those who hold debts that mature in period 2 get nothing. Hence, $1 + r_L = (1 - p)^{-1}$.

So we have an endogenous term structure, which depends on the maturity of the debt chosen by the representative investor. If $d > \left(\frac{R-1}{R-\rho}\right)\rho k$, ST debt is indeed cheaper (in a contractual sense) than LT debt: $r_L > r_s$.

Notice that the quantity of ST debt chosen affects not only the ST interest rate, but the LT one as well. This is, of course, because high volumes of short maturity obligations reduce the probability that holders of long term claims will be repaid. In a more general model in which borrowers in short and long maturities were different sets of agents engaged in different kinds of economic activity, this would mean that the actions of ST borrowers have an "external effect" on LT borrowers. This externality could operate, for instance, through the availability of reserves at the Central Bank: an increase in ST foreign indebtedness might reduce the stock of reserves that agents anticipate will be available to service LT claims, thereby making these longer maturity obligations riskier.

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3.3 Choosing debt maturity

Does the existence of a yield curve, with longer debt more expensive, mean that short debt will always be chosen? Not necessarily. That depends on the extent to which lenders can distinguish among investors in the same country, and the extent to which the representative local investor internalizes the dependence of the term structure on her own chosen debt maturity.

Consider first the case in which the investor takes into account this endogeneity, including equations 3 and 6. Then it is easy to show that if $d \leq \rho k$, expected investor consumption is given by $(R-1)k - p(R-\rho)\left(\frac{d}{\rho}\right)$, while if $d > \rho k$, the equivalent expression is $(R-1)k - p(R-\rho)k$. Expected consumption falls with d for $d \leq \rho k$, and is independent of d for $d > \rho k$. It is clearly maximized at $d = 0$.

Therefore, an investor who realizes that the contractual interest rates she pays depend on the level of ST chosen will choose to take out no ST debt, even though $r_S \leq r_L$. The intuition is simple. Lenders have rational expectations, and hence charge a premium to compensate for possible losses; ST debt is therefore cheap in the contractual sense, but not in the expected value sense. At the same time, ST debt is potentially dangerous, for it requires costly liquidation in the event of a run, and runs happen with positive probability.

That is the optimal market outcome. But clearly there are ways in which market failure could occur in this context. It is easy to imagine many reasons why debt choices by individual borrowers might be distorted, so that private and social incentives do not coincide:[6]

- Individual borrowers fail to take into account the fall in country risk ratings that may result from their own higher borrowing.

- Because of informational limitations, foreign lenders cannot distinguish across borrowers from the same country, and treat them all as equally risky. Indeed, the policy of *sovereign ceilings* followed by rating agencies, in which no single company can have a rating higher than the government of its country, suggests that this may well be so.

- The local tax and regulatory structure may inadvertently stimulate ST borrowing.

- The expectation of a bailout, whether rational or not, can encourage reckless behavior.

- Reckless borrowing may indeed make a bailout more likely, thereby having external effects.

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[6] For a list and discussion, see Furman and Stiglitz 1998. Some of the points that follow are theirs.

To illustrate, consider a simple case in which the short maturity of foreign debt is due to the fact that borrowers fail to internalize the social effects of reducing their liquidity. Suppose that there are not one but many local investors, each of which solves the same problem as in the previous subsection but with one crucial difference: each investor takes both interest rates as given, and expects $r_S < r_L$. Then, expected consumption of the representative investor is $(1-p)\left[Rk - (1+r_L)(k-d) - (1+r_S)d\right]$,[7] so that this expectation is increasing in d if $r_S < r_L$. Her optimal decision, then, is to set $d = k$. In that case (recall 6), in equilibrium $1 + r_S = \left(\frac{1-p\rho}{1-p}\right)$, while $1 + r_L = (1-p)^{-1}$. Hence, the expectation $r_S < r_L$ turns out to be rational, and the investor is pleased to have chosen only ST debt.[8] Of course, this outcome is individually, but not socially, optimal.

3.4   Short-term debt as a precommitment device

An important possible objection is that ST debt plays no useful role in the analysis thus far. But in reality, there are some reasons why the possibility of borrowing short can be socially beneficial: ST loans may help share risk between borrowers and lenders, or give lenders more control over borrowers' actions and hence help reduce the risk of default. The point is not just academic, for if some kinds of ST debt are socially beneficial, policies that discourage such borrowing may have costs as well as benefits.

Consider, for illustration, a case in which default is possible, and ST debt acts as a kind of precommitment device that ameliorates the default problem.[9] Assume that there are two kinds of governments: orthodox governments that always repay foreign debt and permit private debtors to do the same, regardless of circumstance; and populist governments that may choose to repudiate their debts or impose exchange controls that prevent private debtors from repaying their foreign loans. A populist government behaves opportunistically, repaying debts only if it is in its short-term interest (or that of the local borrower) to do it.

To make the story interesting, in the sense that populists do not *always* cause a default,

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[7]Notice that this expectation includes only the consumption level if there is no run, for in the event of a run consumption is zero: all resources go to paying foreign creditors.

[8]There is a second possible, though very implausible, equilibrium. Suppose that the investor expects $r_S = r_L$, so that her expected consumption is independent of d. Suppose also (implausibly) that, since d is not determined, she sets $d = 0$. Then, the expectation $r_S = r_L$ turns to have been correct, and we have an equilibrium with no ST debt. The problem, of course, is that the investor is very unlikely to set $d = 0$. If she randomized, for instance, across all possible $d \in [0, k]$, the probability associated with hitting zero exactly would also be zero.

[9]Jeanne (1998) has built a model with a similar mechanism.

assume that default is costly. If in period 2 the government defaults on its outstanding loans, a portion $\alpha < R^{-1}$ of the income produced by the project is lost. Default costs may include sanctions, litigation and other transactions costs, etc. Hence, in the event of a default the investor ends up with $R(k - \ell)(1 - \alpha)$ units of consumption.

Timing is as follows. Between periods 0 and 1 an orthodox government is always in office. Late in period 1 there is an election. With probability π a populist wins, and with probability $1 - \pi$ an orthodox leader is elected. Election results become known before lenders choose whether to rollover their debts at the end of period 1. Then a run occurs with probability p if d is large enough to make a run feasible. But even if a run does not occur, rational lenders may choose not to roll over ST debts if a populist has been elected. Quite crucially, rollover decisions are made once election results are known but before the new government takes over, so that ST debts will always be repaid to the extent that available resources permit.[10]

The interesting case occurs if a populist is elected and no generalized run or panic occurs. In that situation, whether lenders refuse to roll over loans depends on whether they expect the government will cause a default; and the default incentives faced by the government depend crucially on the maturity structure of debt. It is in this context that ST debt can have desirable incentive effects.

To see this, consider the options faced by a newly elected populist government if no run takes place. If it can assure lenders that loans will be repaid (by causing project income, for instance, to be deposited in an international escrow account), ST debts will be rolled over, and consumption by the representative local borrower is $Rk - (1 + r_S) d - (1 + r_L)(k - d)$. If the newly elected government cannot (or does not want to) reassure investors, holders of ST debts will refuse to roll them over and some early liquidation of the project will take place. Having nothing to lose, the government will indeed decree a default when it comes to office. In that case, consumption by the representative local borrower is $R\left(k - \frac{d}{\rho}\right)(1 - \alpha)$.

The newly elected government will choose the escrow account option if consumption by the representative individual is larger in that case. The choice depends on how much ST debt there is.[11] For the sake of brevity, consider just the polar cases of $d = 0$ and $d = k$. If $d = 0$, then no runs can take place and $r_s = 0$. Will a default take place?

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[10]This is a very realistic assumption. There is often a "bunching" of amortizations in the window between elections and the corresponding transfer of power.

[11]To evaluate which consumption level is higher one must pin down the value of the relevant interest rates; they, in turn, depend on the size of d. One could readily compute, as we did in an earlier section, r_S, r_L and expected borrower consumption for each d, and then use the results to identify the socially optimal level of ST debt.

With default the representative borrower consumes $Rk\left(1-\alpha\right)$, and without it consumes $\left(R-1\right)k$. Since we have assumed $\alpha < R^{-1}$, consumption is higher under no payment, and the opportunistic government will prefer a default. With rational expectations, $d=0$ will cause $1+r_L = \left(1-\pi\right)^{-1}$, since after a populist triumph in the elections, holders of LT debt get nothing. If no ST debt is chosen in period 0, then expected consumption by the representative borrower is $\left(R-1\right)k - \pi\alpha k$.

If only ST debt is chosen and $d=k$, on the other hand, default can never take place in equilibrium: the expectation of a default would cause all debt to be redeemed in period 1, and early liquidation of the whole investment would leave nothing for the borrower to consume. But runs can clearly occur in equilibrium, so that $1+r_L = \left(1-p\right)^{-1}$ and r_S is given by equation 6 evaluated at $d=k$. With that information it is easy to compute expected consumption by the representative borrower, which is equal to $\left(R-1\right)k - p\left(R-\rho\right)k$.

Comparing the two expressions for expected consumption we see that having no ST debt is better *ex ante* if and only if the probability of electing a populist and the cost of the potentially associated default are sufficiently small: $\pi\alpha < p\left(R-\rho\right)$. The intuition is clear: the positive incentive effect of ST debt is most useful in countries prone to populist policies. This benefit shows up in lower contractual interest rates, since debt that is sufficiently short in maturity reduces the risk of default. In such an environment, eliminating all ST borrowing would be socially harmful.

3.5   Implications

The model sketched out in this section has several important implications:

- Runs can only occur when investors take on sufficiently large amounts of ST debt.

- The larger the stock of ST debt, the larger the size of a run..

- The larger the stock of ST debt, the larger the real consequences (in terms of costly liquidation and reduced output and consumption) of a run.

- Distorted incentives can cause investors to take on ST debt, even if doing so is socially costly. Hence, there may be a case for discouraging short maturities through public policy.

- But ST debt can play a useful role (for instance, by serving as a precommitment device). Hence, policies that sharply reduce ST flows can have costs as well as benefits.

4 Short-term external debt: an empirical analysis

Short-term capital flows comprise a wide array of financial transactions: trade credits, commercial bank loans with a maturity of less than one year, and short-term private and public debt (both in local and foreign currencies) issued abroad or sold to non-residents.

The statistical coverage of these transactions and of outstanding stocks is imperfect. The OECD, BIS, World Bank, and the IMF all provide some data on short-term debt for developing and transition countries, but do so with some gaps.[12] In what follows, we use data from the Institute of International Finance (IIF 1998). These data have been collected largely from national sources, and have the advantage that in principle they include all forms of suppliers' credits as well as non-residents' holdings of government bills (including debt issued in local currency), in addition to liabilities to commercial banks and other foreign-currency denominated borrowing.[13] The IIF presentation of the data allows us to distinguish between medium- and long-term debt and short-term debt, and in the latter category between debt owed to banks and other debt. The main shortcoming of the IIF source is that the coverage is limited to 37 emerging-market economies. For our purposes, however, this is not a major concern, as these countries constitute the relevant sample for the analysis.

A caveat is that, because comparable data are not currently available, we have not included short-term domestic public debt in our work even though a run on such public debt can also cause illiquidity and crises. In the Asian crisis, this is not likely to be an important omission. Around the time of the collapse there does not seem to have been much short term public debt in the strongly affected countries of Indonesia, Korea and Thailand (see Table 3 of Ito, 1998).[14] However, public debt probably played a role in other episodes. We

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[12]These international organizations have recently pooled their resources to provide a unified set of quarterly statistics on external debt The data are available at http://www.oecd.org/dac/debt/. The short-term debt stocks reported by these agencies cover liabilities to non-resident banks, official or officially guaranteed trade credits, and debt securities (i.e., money market instruments, bonds and notes) issued abroad. Their data are put together largely from creditor and market sources. Coverage is poor or non-existent in the following areas: (i) non-officially guaranteed suppliers' credit not channeled through banks; (ii) private placements of debt securities; (iii) domestically issued debt held by non-residents; and (iv) deposits of non-residents in domestic institutions.

[13]We are grateful to William Cline of the IIF for making the data available, as well as for clarifications on sources and coverage.

[14]Except for Brazil, public debt has not been a major problem recently for comparable Latin American countries either. Mexico managed to extend the maturity of its public debt after the 1994 collapse. At the end of September 1994, short term domestic federal debt was equivalent to US $26.1 billion; by the end of

know that the Mexican government's inability to roll over its large stock of short term debt (in particular, the infamous Tesobonos) was to prove key in triggering the financial crisis in December 1994. More dramatically, Brazil's internal debt situation seems to be crucial for understanding its current predicament.

4.1   Debt maturity and crises

Even though short-term debt exposure figures prominently in the long list of culprits for the Asian financial crisis, few empirical studies have been able to draw a tight empirical connection between currency or balance-of-payments crises and short-term debt. Kaminsky, Lizondo and Reinhart's (1998) comprehensive survey of the empirical literature uncovers essentially no evidence that the maturity profile of external debt matters for crises. The variables highlighted by this literature as leading indicators of currency crises are the level of reserves, the real exchange rate, credit growth, credit to the public sector, and inflation, but not short-term debt (Kaminsky et al. 1998). One reason, as noted by Furman and Stiglitz (1998, 51), is that not many of these studies have focussed on the composition of foreign debt. Three exceptions are Sachs, Tornell and Velasco (1996); Frankel and Rose (1996) and Eichengreen and Rose (1998). The first of these papers finds weak evidence that the share of short term capital flows in total flows helps predict which countries were affected by the tequila effect in 1995. The second finds no statistically significant relationship between the share of short-term debt and the incidence of currency crises, while the third concludes that a higher share of short-term debt actually decreases the probability of banking crises.

A recent paper by Radelet and Sachs (1998) is, to our knowledge, the only paper that presents systematic evidence on the culpability of short-term debt. These authors provide a probit analysis for 19 emerging markets covering the years 1994-1997. Their crisis indicator is a binary variable that takes the value of 1 when a country experiences a "sharp shift from capital inflow to capital outflow between year $t-1$ and year t" (Radelet and Sachs 1998, p. 23). They classify nine cases as such: Turkey and Venezuela in 1994, Argentina and Mexico in 1995, and Indonesia, Korea, Malaysia, the Philippines, and Thailand in 1997. Radelet and Sachs measure short-term debt exposure by taking the ratio of short-term debt to foreign banks (from BIS) to central bank reserves. They find that this ratio is associated positively and statistically significantly with crises (as is the increase in the private credit/GDP ratio in

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June 1997 this figure was down to less than US $8.5 billion. Argentina, Chile and Peru have not issued domestic short term debt in any substantial magnitude.

the previous three years). They find no evidence that crises are associated with corruption. They find only weak evidence on the current-account deficit and, even more surprisingly, no evidence on the role of real exchange rate appreciation.

We present here an exercise in the spirit of Radelet and Sachs (1998), extending their analysis in two directions. First, we use the IIF database (IIF 1998), and can thus distinguish consistently between short-term debt owed to foreign banks and other short-term debt, as well as between short-term and medium- and long-term debt. By contrast, the BIS statistics on which most recent analyses have relied provide information only on short-term debt owed to foreign banks.[15] Second, the IIF database allows us to expand the scope of the empirical analysis: we cover the period 1988-1998 and 32 emerging-market economies, giving us a much larger sample of observations as well as more crises.[16]

In defining a financial crisis, we focus on the proximate cause: a sharp reversal in capital flows. Hence we follow the definition of Radelet and Sachs (1998) rather than that of the earlier literature, which emphasized currency depreciations and/or reserve reductions. We assume there is a crisis when there is a turn-around in net private foreign capital flows (B_t) of 5 percentage points of GDP or more.[17] Operationally, our crisis variable is a $0 - 1$ variable which takes the value 1 in any year in which $B_{t-1} > 0$ and $(B_{t-1} - B_t)/Y_{t-1} > 0.05$. The value of crisis is set to missing for the two successive years following a year in which crisis $= 1$ (again following Radelet and Sachs).[18]

This exercise yields 16 instances of crises, listed in Table 2. The sample includes all but two of the cases identified by Radelet and Sachs (1998) as well as many others. The two instances of crisis in Radelet and Sachs that do not meet the 5 percent threshold are Argentina (1995) and Malaysia (1997). Note that Malaysia is listed instead as having had a "crisis" in 1994, with a whopping turnaround in private capital flows of 20 percent of GDP (which

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[15]The correlation between the statistics on short-term debt to commercial banks provided by the two sources is very high, typically of the order of 0.9 (with some exceptions).

[16]The IIF database includes an additional five oil-exporting countries, which we have excluded from the analysis.

[17]Private capital flows are loans from commercial banks and other private credit, excluding equity investments.

[18]Also, we have excluded from the sample a few data points with extremely high values of short-term debt to reserves (greater than 5). Russia (in 1991) and Cote d'Ivoire (in 1992), for example, had short-term debt (to banks)/reserves ratios of 312 and 217, respectively. Since short-term debt is our focus, leaving such observations in would result in outliers in the probit analysis that would cloud the interpretation of the results.

followed the imposition of capital controls on inflows in January 1994 as discussed below).[19] Additional crises include Bulgaria, Hungary, and the Philippines (all in 1990), Uruguay (1990 and 1993), and Ecuador (1996). Some of these cases are arguably not instances of crisis in the sense of financial collapse, and seem related to idiosyncratic developments (such as the transition from socialism in the cases of Bulgaria and Hungary in 1990). But rather than exercise discretion, which leaves the empirical results open to interpretation, we have decided to follow the 5 percent rule rigidly. One exception is that we have included Russia (1998) in the crisis sample, even though we did not have data on private capital flows for all of 1998 at the time of this writing. The results reported below are robust to the exclusion of Russia or of any of the other cases from the sample, as well as to changes in the definition of a crisis. We are fairly confident that our findings on the importance of short-term debt are not an artifact of arbitrary decisions regarding thresholds, sample coverage, and other methodological choices.

As Table 2 reveals, countries experiencing sharp reversals in capital flows tend to have higher shares of short-term debt in total, but where they really stand apart is in terms of short-term debt/reserves ratios. On average, crisis cases have short-term debt/reserves ratios that are twice the level that obtains in other cases (1.49 versus 0.76 for debt owed to banks, and 1.59 versus 0.71 for other debt). At the same time, the table reveals instances of crises in the presence of quite low levels of short-term exposure as well (e.g., Ecuador 1996; Venezuela 1994)

The relationship between short-term capital flows and financial crises is examined more systematically in Table 3, which presents probit regressions. Columns (1) and (2) are bivariate probits, where crisis is regressed solely on an indicator of short-term debt exposure. The first indicator is a dummy variable which takes on a value of 1 whenever the (lagged) value of short term debt to foreign banks/reserves exceeds unity. The estimated coefficient is statistically highly significant, indicating that countries where this ratio is higher than unity have a 10 percentage points higher probability of experiencing a crisis (compared to countries where the ratio is below one). Since the average probability of crisis in our sample is 0.06, this corresponds roughly to a tripling of the crisis probability (0.16 versus 0.06). Column (2) shows that there is a tight bivariate relationship between crisis and the share of short-term debt in total debt as well.

In the remaining regressions of Table 3, we introduce simultaneously the ratios of three

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[19]The capital controls were meant to stem the flow of large amounts of short-term speculative funds gambling on the appreciation of the Malaysian currency.

different types of debt to reserves (all in continuous form rather than as a dummy): (a) short term debt owed to banks; (b) other short-term debt; and (c) medium- and long-term debt. Both types of short-term debt enter with positive and statistically significant coefficients (with the exception of other short-term debt in column (8)). The point estimates reveal that the impact of short-term borrowing from banks is larger. Interestingly, medium- and long-term debt enters with a small, negative, and statistically significant coefficient, indicating that longer term borrowing is associated with a lower probability of crisis (even when holding the short-term debt stock constant). One interpretation is that the medium- and long-term debt stock is correlated with omitted country attributes that increase creditworthiness and reduce the propensity to crises.

The probit estimates also indicate that crisis probabilities are increasing in the overall debt burden (measured by the debt-GDP ratio), the current account deficit (as a percentage of GDP), and the appreciation of the real exchange rate (measured over the previous three years). These results are consistent with previous empirical work. On the other hand, budget deficits, the ratio of M2 to reserves, and the change in credit-GDP ratios do not appear to have a statistically significant relationship with crises. Indeed, once the debt ratios are included, all three of these variables enter with the "wrong" sign.

We note that these results remain essentially unchanged when we exclude the 1997 and 1998 observations from the sample, restricting attention to reversals in capital flows prior to the Asian crisis and the Russian meltdown. In particular, short-term debt/reserves ratios continue to enter with highly significant coefficients. It does not appear therefore that the perils of short-term capital flows are of very recent vintage. Moreover, substituting BIS data on short-term debt (to commercial banks) for the IIF data yields results that are virtually identical.

In short, these results provide strong support for the idea that potential illiquidity —in particular, the ratio of short-term foreign debt to reserves— is an important precursor of financial crises triggered by reversals in capital flows. Our evidence is consistent with the idea that illiquidity makes emerging-market economies vulnerable to panic. At the same time, it bears repeating that such crises remain highly unpredictable. The overall "fit" of the probits is poor, and certainly of not much use for predictive purposes, even when applied in-sample. For instance, the in-sample predicted probabilities of crisis for South Korea, Thailand, and Indonesia in 1997 are 0.54, 0.24, and 0.19, respectively. The corresponding out-of-sample probabilities are 0.31, 0.17, and 0.13. Empirically, a high ratio of short-term debt to reserves is neither a necessary nor a sufficient condition for financial panic.

4.2 Short-term debt and the severity of crises

We have analyzed so far the relationship between short-term capital flows and the onset of crisis. As the model in section 3 suggested, short-term debt exposure is also likely to affect the severity of the shock once a crisis does erupt. When confidence disappears and debt rollovers become difficult, the entire stock of a country's short-term foreign debt may have to be paid back within a year. A country with a short-term debt/GDP ratio of, say, 15 percent, could in principle have to pay 15 percent of its GDP to its creditors in a single year. Generating an external transfer of this magnitude is likely to be quite costly, not only to levels of domestic absorption, but also to real activity. The latter effects can come about through a costly liquidity squeeze, through the effects on balance sheets of the drop in asset values and the currency depreciation that accompany the crisis, and through traditional Keynesian multiplier channels.

One might then expect the costs incurred, conditional on having a crisis, to be proportional to the pre-existing stock of short-term foreign debt. In this section, we present a range of evidence that suggests that this is indeed the case.

We find that it is the ratio of pre-existing short-term foreign debt to reserves that seems to matter to the severity of the crisis, and not the ratio in relation to GDP. A reason why the former ratio may be the relevant ratio has to do with within-country contagion. Imagine that in a crisis the holders of all short-term debt in the economy —including M1, short-term domestic debt of the public sector— come to fear that international reserves will be exhausted by the service of short-term foreign debt. Then they will attempt to flee as well, and will succeed in doing so as long as there are dollars in the Central Bank, or as long as the capital account remains open. So with low reserves, the turnaround in capital flows as a proportion of GDP can be much higher in a panic.

Figure 3 shows that there is a tight relationship between the magnitude of the collapse in growth, conditional on having experienced a capital-flows crisis as defined previously, and the pre-existing short-term foreign debt exposure (measured in relation to reserves). In our sample of 16 crises, the average reduction in the growth rate in the year of crisis (relative to the previous year) is 4.1 percent. But countries like Turkey (1994) and Mexico (1995), with very high levels of short-term debt have suffered much greater collapses in real economic activity than Malaysia (1994) or Venezuela (1994). The statistical regularity in our sample is that an increase, say, from 0.5 to 1.5 in the short-term debt owed to foreign banks in relation to reserves is associated with a reduction in growth of 2.3 percentage points (the

associated t-statistic being a highly significant -3.8).

Part of the explanation for this relationship has to do with the greater downward pressure on the exchange rate in highly illiquid economies. A collapse of the exchange rate caused by financial panic wreaks havoc with private-sector balance sheets and absorption, imparting strong recessionary effects in the short run. In the case of East Asia, there was indeed a strong correlation between short-term debt and the extent of currency depreciation following the collapse of the Thai peg in July 1997 (see Figure 4). During the second half of 1997, currencies plummeted to greater depths in Korea, Indonesia, and Thailand, the countries with the highest short-term debt-reserves ratios in the region, than they did in the Philippines, Malaysia, or Thailand. The first set of countries also suffered greater reductions in economic activity.

As we discussed earlier, the buildup of short-term debt in East Asia is a relatively recent phenomenon. Therefore another way of illustrating the downside of short-term debt exposure under crisis conditions is to compare the recent experience of East Asia with previous episodes of balance-of-payments crisis in the region. For this purpose, Table 4 shows the evolution of macroeconomic indicators in Korea during the recent crisis as well as during the crisis of 1980. Indonesia and Thailand did not experience external crises of a comparable magnitude during the last two decades and therefore do not allow a similar comparison.

Begin by noting that the external shocks experienced by Korea in 1979-1980, while originating mostly on the current account rather than the capital account, were quite severe by any measure. There was the second oil price hike, the Volcker shock of higher world interest rates, and the worldwide recession, which reduced foreign demand for Korean exports. The balance-of-payments cost of the first two alone amounted to 6 percent of GDP (Aghevli and Marquez-Ruarte 1985, p. 5). In addition, the economy was faced with a large reduction in agricultural output (amounting to a loss of more than 4 percent of GNP) and considerable political turbulence due to the assassination of President Park.

During the second half of the 1970s, South Korea had borrowed heavily from foreign commercial banks to finance an ambitious investment program, implemented via close collaboration between the government and the *chaebol*. In many ways, the current crisis bears a lot of resemblance to the 1980 crisis. In both cases, prior to the crisis we have a debt buildup, limited exchange rate flexibility, some real appreciation of the currency, deceleration of export growth, real wage increases, negative terms-of-trade shocks (the oil shock in 1979-80; the fall in the price of semiconductors in 1996-97), and other adverse external shocks (world interest rate increases and slowdown of world economic activity in the first case; contagion

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from Thailand and the slump in Japan in the second)–all against a background of political instability. The structural problems afflicting the Korean economy in the late 1970s were said to be chronic excess demand for bank loans, rapid credit expansion, excessive investment in certain sectors, an inflationary environment, duplication of investment and build-up of excess capacity (due to availability of cheap loans and overly optimistic assessment of the prospects in the domestic and world economy), and a rapid expansion of housing. Except for the inflationary environment (and maybe substituting general property and asset price boom for the housing boom), all the other factors have been mentioned in relation to the current crisis. The current-account deficit was 2.2 percent of GDP in 1978 and 6.4 percent in 1979–similar to the deficits of 1.9 percent in 1995 and 4.7 percent in 1996.

However, the debt that Korea piled on during the 1970s was mostly medium- and-long term, and this sharply limited the potential magnitude of capital-flow reversals at the time of crisis. On the eve of the stabilization program of January 1980, total short-term debt stood at 8.4 percent of GDP and 97 percent of reserves. These figures are much lower than the numbers that prevailed on the eve of the most recent crisis. In late 1997, when Korea was forced to respond to the forces of contagion emanating from Thailand, short-term debt stood at around 15 percent of GDP and more than 300 percent of reserves.

The key difference between the two episodes therefore is that Korea became illiquid in 1997 and subject to creditors' panic. Unable to roll over its short-term debt, the country had to generate a huge current account surplus at substantial real cost to the economy. In 1980, the Korean economy faced no such difficulty. Korea was able to run in 1980 an even larger current-account deficit than in previous years. It accomplished this by relying heavily on short-term borrowing. The tilt towards short-term borrowing was due in part to the hesitation of creditors to commit long-term funds in the face of political and economic uncertainty. As a consequence, during 1980-81 Korea's short-term debt ratios increased substantially and the maturity structure of its debt shortened significantly (see Table 4). In 1997, short-term liabilities were an instigator of the crisis and could hardly play the role of savior. Korea had to generate a mammoth current account surplus of 13 percent of GDP instead (compared to a deficit of 8.5 percent in 1980). The currency depreciation was commensurately larger, as was the decline in economic growth.

The moral of the Korean comparison is quite clear. Regardless of fundamentals, a large exposure to short-term debt intensifies the costs of a crisis because it magnifies the current-account adjustment and currency depreciation that have to be undertaken.

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4.3 Determinants of the maturity structure of debt

In 1997, 58 percent of Uruguay's total foreign debt (according to IIF statistics) was short-term. In Morocco, meanwhile, only 3 percent of debt was short-term. Are there systematic factors that account for the maturity structure of foreign debt across countries as well as over time within countries?

A plausible list of possible determinants includes the following. First, as we emphasize in the theoretical model in section 3, short-term debt can have a useful role to play in fostering efficient financial intermediation –and, indirectly, investment and growth. For this and other (potentially less benign) reasons, we would expect both the demand and supply for maturity-transformation services to increase with financial sophistication. As the productivity of an economy and its financial depth increase, the ratio of short-term debt should therefore increase, *ceteris paribus* credits and other types of credit to importers are trade-related. Consequently, the volume of short-term debt should also increase with the openness of an economy. Third, corruption and cronyism in the debtor countries, generating expectations of bailouts, can result in inadequate internalization of the risks of short-term borrowing. Hence, we might expect short maturities to be associated with high levels of corruption.

Finally, governments have at their disposal a whole range of financial and regulatory policies that influence the maturity structure of capital flows. Often, regulatory policies have the effect of stimulating short-term capital flows. The Basle capital adequacy standards, for example, encourage short-term cross-border lending to non-OECD economies by attaching a lower risk weight to short-term loans than to long-term loans. The Bangkok International Banking Facility (BIBF) set up by the Thai government in early 1993 was specifically aimed at attracting short-term funds from abroad. And the Korean government is often blamed for having encouraged short-term inflows by making longer-term investments in Korea (such as equity investment or purchase of government bonds) difficult for foreigners. On the other hand, limits on the short-term foreign liabilities of domestic banks, deposit requirements on capital inflows, and restrictions on the sale of short-term securities to foreigners are examples of the types of policies that can reduce short-term capital inflows. We will discuss the Chilean and Malaysian examples below.

Table 5 presents some econometric evidence on the determinants of the maturity of external debt. The table shows cross-country and panel regressions (with fixed effects) using the sample of 32 emerging-market economies on which we have been focussing. The depen-

dent variable is the share of short-term debt in total debt. The results support some of the above hypotheses, but not all. There is indeed a consistent and robust relationship between per-capita income levels and M2/GDP ratios, on the one hand, and short maturities, on the other. This relationship holds both across countries and within countries over time. That is, as economies get richer and financial markets become deeper (through financial liberalization or other channels), the external debt profile gets tilted towards short-term liabilities. We find also that the overall debt burden (debt/GDP ratio) is positively correlated with short-term borrowing in the time-series (but not in the cross-section). One interpretation is that countries that go on a borrowing binge are forced to shorten the maturity of their external liabilities in the short run.

To gauge the effect of corruption we use Transparency International's index of corruption. We find that the relationship between levels of short-term borrowing and corruption is positive, but not statistically significant (column 3).

Most surprisingly, we find no relationship between trade and short-term debt. In fact, the estimated coefficient on the imports/GDP ratio is negative, suggesting that if anything more open economies tend to do less short-term borrowing. This is puzzling in view of the idea that short-term borrowing is driven in part by trade credits. One possibility is the following.[20] Suppose that more open economies tend to be more creditworthy (because they have more to lose from defaulting on their debt and/or can provide greater collateral to their creditors). They will be less credit-rationed in the market for long-term finance. Hence, they will have higher ratios of long-term debt to GDP. Even if such economies also have higher levels of short-term debt, the net effect on the maturity composition of the debt would still be ambiguous. The evidence provides partial support for this interpretation. In our sample, increases in openness (measured by import-GDP ratios) are associated in a statistically significant way with higher ratios of long-term debt to GDP, but not with higher ratios of short-term debt to GDP. The inescapable conclusion is that the levels of short-term debt that we observe in the real world are only weakly, if at all, related to trade flows. Whatever it is that drives short-term capital flows, it is not international trade.

The regressions in Table 5 leave a lot of the variance in the maturity composition of external debt unexplained. One reason is that it is difficult to quantify the myriad policies and regulations that directly affect short-term capital flows.[21]

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[20]We thank Aaron Tornell for suggesting this possibility.

[21]See Montiel and Reinhart (1997) for an effort to do so. Focusing on capital flows of different types in a sample of 15 countries, these authors find that capital controls tend to reduce the share of short-term flows

5 Conclusions and Implications

We have to live with financial markets that are prone to herding, panics, contagion, and boom-and-bust cycles. This is as true of domestic financial markets–where they can do more limited damage– as it is of international ones. The world has seen banking crises in 69 countries since the late 1970s, and 87 currency crises since 1975.[22] And the frequency of such crises has risen sharply over the last decade. After the recent series of meltdowns in Asia, Eastern Europe and Latin America, no observer can be surprised at the apparent instability of financial markets.

The debate on the causes of these crashes will undoubtedly go on for a long time. Bad luck, in the form of exogenous shocks from abroad and from mother nature, and bad policy, in the shape of poor regulation and imprudent macro policies, doubtlessly carry some of the blame. But that cannot be the end of the story. The main message of this paper is that the potential for illiquidity was at the center of recent crises, and that short-term debt is a crucial ingredient of illiquidity. The empirical evidence is clear in that respect.

In the aftermath of the crises, the reaction, particularly from multilateral lenders but also from Wall Street, has been to call for more prudent monetary and fiscal policies, and greater supervision and transparency in local financial markets. But appropriate macroeconomic policies and financial standards can go only so far in reducing the risks.

There is limited agreement on what macro policies are "appropriate" in this context. Analysts of the Asian episodes, for instance, seem to be evenly divided between those who think that countries like Thailand and Indonesia held on to fixed exchange rates for too long and those who claim that the defense of the peg was insufficiently fierce.

The current emphasis on strengthening domestic financial systems also glosses over the practical difficulties. Putting in place an adequate set of prudential and regulatory controls to prevent moral hazard and excessive risk-taking in the domestic banking system is a lot easier said than done. Even the most advanced countries fall considerably short of the ideal, as their bank regulators will readily tell you. Indeed, banking crises have recently taken place in countries as well off as Sweden and Japan. The collapse of Long Term Capital in

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while sterilized intervention increases it.

[22]The bank crises number comes from Caprio and Klingebiel (1996). A banking crisis occurs, in their definition, when the banking system has zero or negative new worth. The figure excludes transition economies which, by their estimate, would add at least 20 crises in the period. The currency crisis figure is from Frankel and Rose (1996), who define such a crisis as a year in which the currency depreciates by more than 25 percent, and this depreciation is at least 10 percentage points larger than the previous year's.

the summer of 1998 revealed a gaping hole in the regulatory arrangements of U.S. financial markets. If this happens at the heart of the OECD, one can imagine the scale of problems facing bank regulators in Ecuador, India or Turkey.

The moral of the story, then, is that financial crises are as difficult to avoid as they are to understand. There is no magic fix that will make them go away. Our incomplete understanding of how financial markets work, along with changing fads and disagreements on what constitutes "sound" economic policy in developing economies, suggest caution in attempting to impose a one-size-fits-all recipe on borrowing countries (Rodrik 1999). A pragmatic and flexible approach that works on several fronts at once may be the more prudent strategy. And one of those fronts, undoubtedly, is increasing liquidity and discouraging short term debt.

5.1   Crisis prevention

One obvious, if not very useful, answer is to require financial systems to be always liquid. But liquidity is costly to maintain, and countries attempting to prevent crises face some unpleasant trade-offs. Chang and Velasco (1999b) and Feldstein (1999) discuss some of the options. On the asset side, using fiscal policy to build a "war chest," and securing contingent credit lines abroad –both to be used in times of trouble– are useful but not without problems. On the liability side, increasing required foreign-currency reserves on banks' liquid liabilities (perhaps making the size of the requirement an inverse function of maturity) can help discourage short term bank debt. Lengthening the average maturity of public debt, as Mexico did after the 1995 tequila crisis, is also crucial to prevent illiquidity.

In addition, across-the-board disincentives to short-term foreign borrowing, such as those used by Chile, Colombia and Malaysia among many others, may help avert illiquidity. The potential role of such disincentives in preventing a possible liquidity crisis should be clear from our earlier theoretical analysis. Three objections are often raised against such controls: that they are ineffective, costly, and that they fail to protect an economy from panic by all relevant players. We briefly discuss each in turn.

Ineffectiveness: Any claim about the ineffectiveness of capital controls must be tempered by the observation that such policies are vehemently opposed by the very markets participants whose actions the controls are supposed to influence. Perhaps bankers and *arbitrageurs* denounce the taxes and ceilings they can presumably avoid with the stroke of a key out of simple public-mindedness, or because of a deep-seated reluctance to break the law. We do

not claim to know.

Furthermore, there is an obvious tension between emphasizing, on the one hand, improved prudential regulation and transparency as an important part of the solution, and maintaining, on the other, that capital controls cannot work because they can be easily evaded through corruption, financial engineering or other mechanisms. If financial markets can evade controls of the latter kind, they can surely evade controls of the former kind as well. Regulatory ineffectiveness may undercut the argument for capital controls, but it undercuts even more seriously the emphasis on financial standards that pervades the G7's approach to the international financial architecture.

In any case, there is growing evidence that controls can be indeed effective. We illustrate this by drawing on the experiences of two countries–Chile and Malaysia–that at some point successfully managed short-term capital inflows.

Chile's capital-account regime appears to represent a canonical case of successful fending-off of short-term capital flows, and for that reason has been studied extensively.[23] In June 1991, the Chilean authorities imposed a non-interest bearing reserve requirement of 20 percent on all external credits. Equity investments were exempt. The reserves had to be held at the Central Bank for a minimum of 90 days and a maximum of one year. As an alternative to the reserve requirement, medium-term creditors were allowed to make a payment to the Central Bank equivalent to the financial cost of the reserve requirement. In May 1992, the reserve requirement was raised to 30 percent and extended to time deposits in foreign currency and to Chilean stock purchases by foreigners. In addition, the deposit period was lengthened to one year (see Agosin and Ffrench-Davis 1998). The authorities eventually began to closely monitor DFI flows to ensure that short-term flows were not disguised as equity investments. In 1998, faced with capital outflows, Chile relaxed and eventually set the required reserve to zero. While it was in force, the reserve requirement had the effect of creating a severe disincentive for short-term capital inflows. At a LIBOR of 5 percent, for example, the annualized cost of the policies in place was 3.9 percent on a one-year loan, but 11.0 percent on a three-month loan (Agosin and Ffrench-Davis 1998, Table 3).

The data on the composition of Chile's external debt suggests quite strongly that the policies had the intended effect. The top panel of Figure 5 shows the share of short-term debt in total for Chile. We note a sharp dip in 1991, the year that the deposit requirement was first imposed. The ratio bounces back in 1992, but following the tightening of

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[23]See, for instance, Valdes Prieto and Soto 1996; Larrain, Laban and Chumacero 1997; Budnevich and Lefort 1997; Agosin and Ffrench-Davis 1998; and Edwards 1998.

the reserve requirement, it steadily falls throughout 1992-1997. By 1997, short-term debt constituted only 7.6 percent of total debt. This informal conclusion is confirmed by more systematic evidence in a number of papers. Valdes-Prieto and Soto (1996), Larrain, Laban and Chumacero (1997), Budnevich and Lefort (1997), and Montiel and Reinhart (1997) all find that the restrictions have affected the maturity composition of flows, though not their overall volume or the course of the real exchange rate.

The case of Malaysia in 1994 is less well known. The country is notorious (in some circles) for the sweeping currency and capital outflow controls that its government imposed on outflows on September 1st, 1998. It is too early to evaluate the consequences of these recent controls in full, but we do have some evidence on a set of temporary controls that were implemented some years earlier in 1994. In January 1994, the Malaysian government imposed a prohibition on the sale to non-residents of a wide range of short-term securities (including banker's acceptances, negotiable instruments of deposit, Bank Negara bills, treasury bills or other government securities with a remaining maturity of one year or less). These restrictions were widened in February (to cover swap transactions in the currency market), and complemented by an interest charge on short-term deposit accounts placed in domestic commercial banks by foreigners. The restrictions began to be lifted in August 1994, and were largely eliminated by the end of the year.

The background to these restrictions was that there had been a huge surge of short-term speculative capital inflows in late 1993 following a surprise 6 percent depreciation of the *ringgit*. Hedge funds and others expecting a quick recovery in the currency flooded the Malaysian market. As the bottom panel in Figure 5 shows, the result was a sharp increase in short-term liabilities, which reached a peak of 37 percent of total debt at the end of 1993. The figure also reveals that the restrictions imposed at the beginning of 1994 were remarkably effective. (So effective in fact that the colossal turnaround in short-term capital flows in 1994 led us above to classify Malaysia in 1994 as a case of "crisis".) The ratio of short-term debt in the total fell sharply to 26 percent in 1994 and to 23 percent in 1995, beginning to recover only in 1996. The overall debt burden fell as well, from 59 percent of GDP in 1993 to 41 percent in 1995.

As we know too well by now, these policies did not prevent Malaysia from getting into serious trouble a few years later. One possible explanation is that the controls were lifted too soon: Figure 2 reveals that the ST debt-to-reserves ratio rose between 1994 and 1997, and Figure 5 reveals that the same happened to the share of ST debt in total debt.

The cases of Chile and Malaysia illustrate the importance of the policy regime in influ-

encing the maturity structure of foreign debt. But policy is not all-powerful. One constraint comes from the growing role of derivatives in international capital flows. As Garber (1998) has stressed, derivatives can help circumvent controls and they render interpretation of standard balance of payments categories problematic. But it is not clear that derivatives can always undo the intended effects of policy. As Garber writes: "Market sources ... report serious, though as yet unsuccessful, financial engineering research efforts to crack directly the Chilean tax on capital imports in the form of an uncompensated deposit requirement."

Costliness: What about the costs presumably involved? In theory, capital controls prevent risk-spreading through global diversification of portfolios. They result in an inefficient global allocation of capital. And they encourage irresponsible macroeconomic policies at home. Is there evidence to support such presumptions?

This issue was examined systematically in Rodrik (1998), by relating capital account liberalization to three indicators of economic performance: per-capita GDP growth, investment (as a share of GDP), and inflation. The indicator of capital account liberalization used was the proportion of years for which the capital account was free of restrictions (according to IMF classifications). The exercise covered a post-1975 sample of around 100 countries. The study found no evidence that countries without capital controls have grown faster, invested more, or experienced lower inflation.[24]

Furthermore, specific episodes of capital controls do not reveal significant real costs either. Chile is a success case of the 1990s, in no small part because it has managed to avoid the de-stabilizing influence of short-term capital flows. Even in Malaysia, where the imposition of restrictions in January 1994 resulted in a massive turnaround in capital flows, growth was unaffected (in fact, the Malaysian economy grew faster in 1994 and 1995 than in 1993).

Other claimants: The other very important caveat is that foreigners are not the only short-term creditors. Hence, imposing controls and reducing external short term debt is neither a necessary nor a sufficient condition for ruling out crises. As Krugman (1999) has stressed, inflow controls still leave all holders of domestic claims on the commercial and central banks ready to run. There is one important distinction, however, between this type of capital flight and the reversal of short-term external flows. Governments are allowed under the existing rules of the IMF (Art. VI) to close the foreign-exchange window so as to prevent capital

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[24]Policy choices regarding the capital account are endogenous, so there is a potential for reverse causation. But to the extent that this is a problem, it biases the results in the direction of finding a positive relationship between open capital accounts and good performance: countries are more likely to remove capital controls when their economies are doing well.

outflows by domestic residents. Hence a run on a country's domestic short-term liabilities can in principle be prevented by legal means. But refusal to pay back short-term foreign debt would abrogate existing debt contracts and would put the country into default. In any case, we view this argument not as one against capital controls per se, but rather as a plea to complement them with other policies. Bank regulation and the exchange rate regime are central in this regard. Again, Chang and Velasco (1999b) and Feldstein (1999) analyze the available options.

5.2   Crisis management

The presence of short-term debt makes a *coordination failure* among lenders possible. Hence, a main task of crisis management is to attempt to coordinate their behavior on the "good" outcome. In the model presented above, the key is to avoid the real costs (liquidation and others) imposed by early repayment. Hence, a simple suspension of payments that preserves the present value of the creditors' claims makes everyone better off. In practice, of course, lenders are wary of such responses. From New York or London it is hard to distinguish the payments moratoria that are justified by liquidity considerations from those that are thinly veiled attempts at default. When in doubt, lenders are likely to suspect the latter. There is also the logistical problem of coordinating the actions of many bond-holders.

Payments reprogrammings that are accompanied by serious macroeconomic policies and signals of creditworthiness (such as fiscal retrenchment) may prove more palatable to creditors. In Korea, for instance, American, European and Japanese banks jointly agreed in December 1997 to an orderly rollover of existing short-term loans. Major creditor countries helped by anticipating the disbursement of a fraction of the bailout package the IMF had just approved. Those two measures effectively ended the financial panic that had gripped Korea for several months.[25]

Multilateral lenders can also help. Just as after appropriate surveillance and conditionality they place their seal of approval on countries that follow sound macroeconomic policies, one could envisage IFIs publicly endorsing temporary payments suspensions or reschedulings in situations where these are justified. Such an endorsement could overcome the perception of *illegitimacy* that surrounds changes in debt repayment terms, however justified. Multilateral

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[25]This description follows Corsetti, Roubini and Pesenti (1998b). These authors also note that the rescheduling of loans was a much more daunting task in Indonesia, where there were large numbers both on the lenders' and borrowers' sides.

lenders could also lend "into arrears" when appropriate in order to strengthen confidence in the borrower's prospects. They could also encourage the adoption of clauses in international bond covenants that facilitate negotiations between debtors and creditors even when debt service is suspended. As Kenen (1999) points out, such proposals were endorsed by the G-10 back in 1995, but have yet to be implemented in full.

Encouraging other kinds of capital flows may also be useful in times of trouble. In the model above, a good part of the problem comes from the local investor's inability to sell rather than liquidate its illiquid assets in the event of a squeeze. That assumption is realistic insofar as, in a crisis situation, there are few domestic agents with the cash in hand to buy the real capital. But foreigners are in a different position. In principle, everyone could be better off if liquidation could be avoided through foreign direct investment –even if the price is that of a fire sale, below the present value of capital's real yield in the future.[26] Therefore, FDI could be useful for these purposes. Debt-equity swaps involving foreign creditors played an important role in the resolution of the 1980s debt crisis, and could be useful again in the current context as part of a broader strategy that includes the elements discussed above. At the same time, a series of financial crises that become the occasion for the sale of national assets to foreigners at bargain-basement prices can be viewed as problematic from the standpoint of the borrowers.

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[26] In the model above, because the world rate of interest is zero and one unit of healthy capital yields R units of the tradeable good in period 2, the "fundamental" price of capital in period 1 is R. But any price smaller than R and bigger than ρ makes the borrower better off (relative to liquidation), while giving the foreign investor an abnormally high rate of return.

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Figure 1
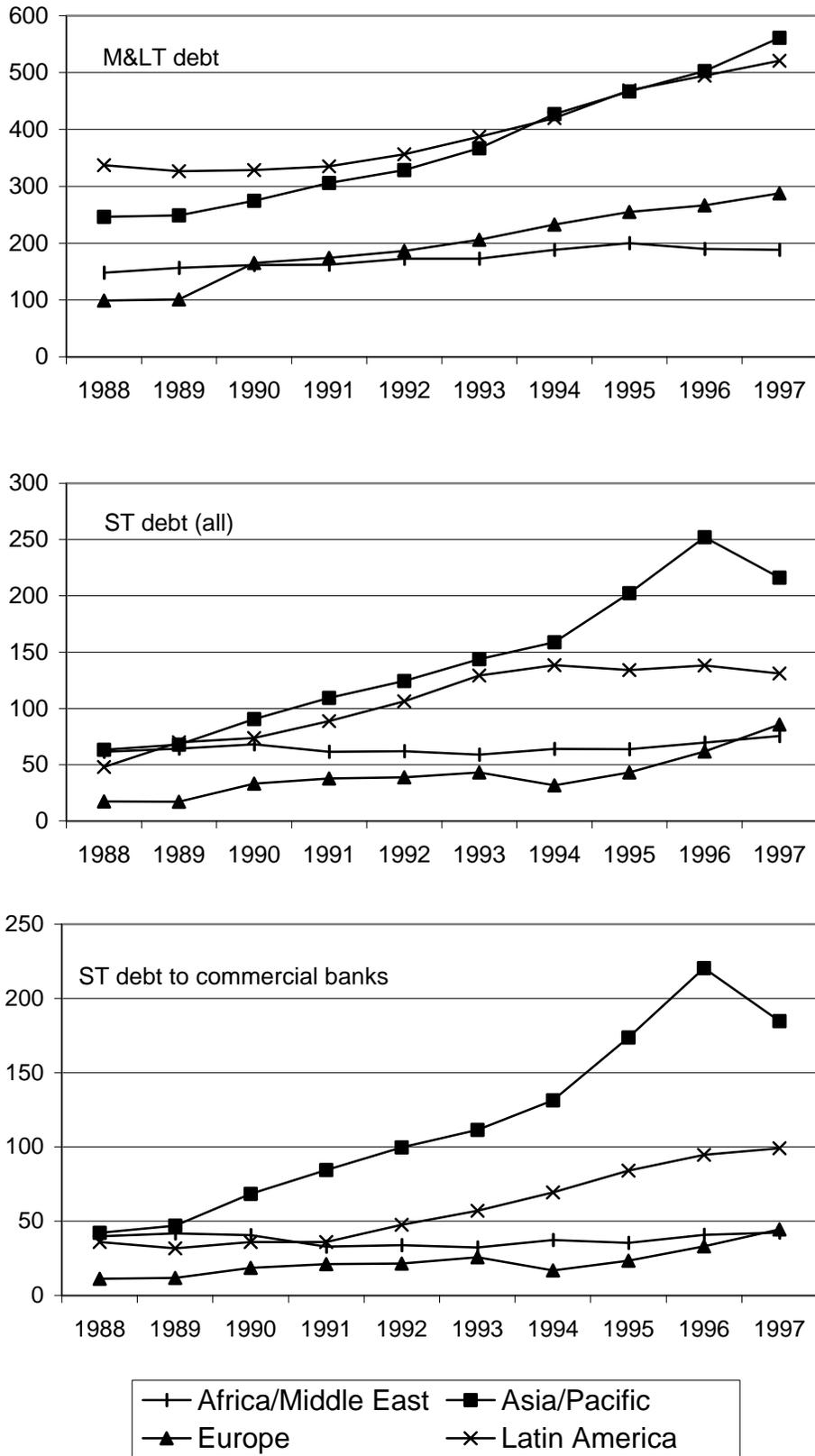
Source: IIF (1998)

Figure 2

Short-term debt/reserves ratios
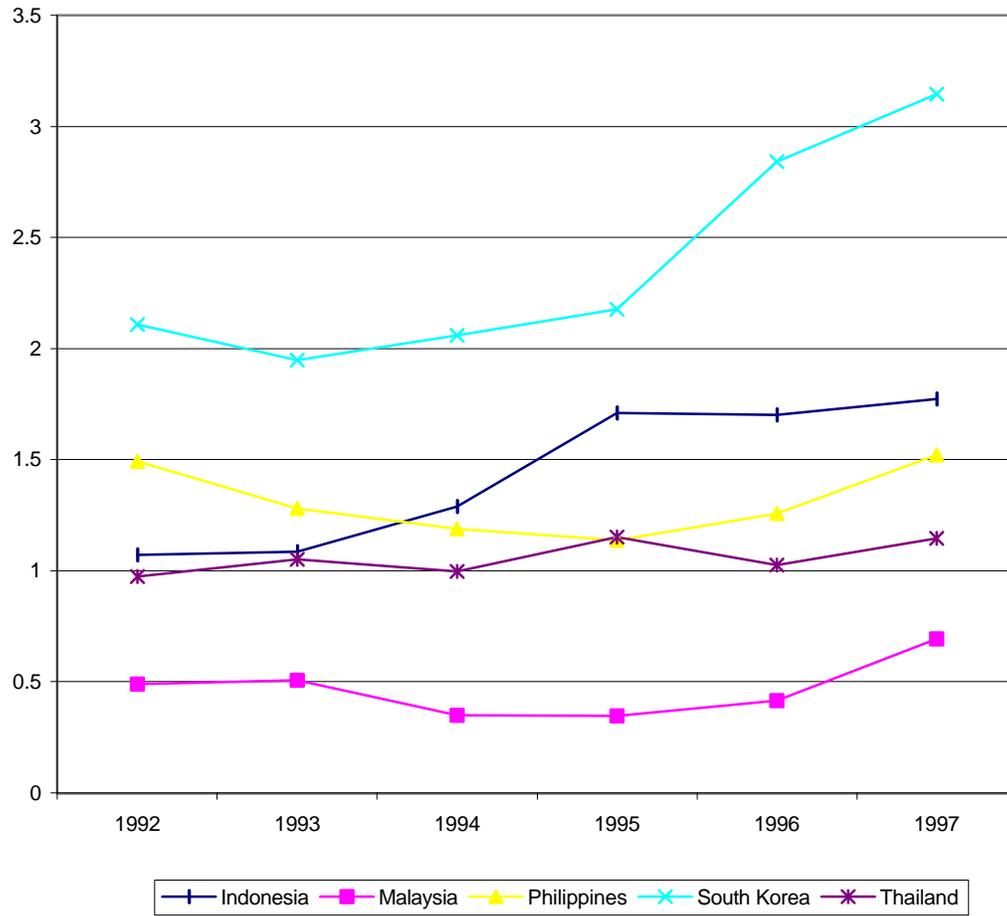
Figure 3
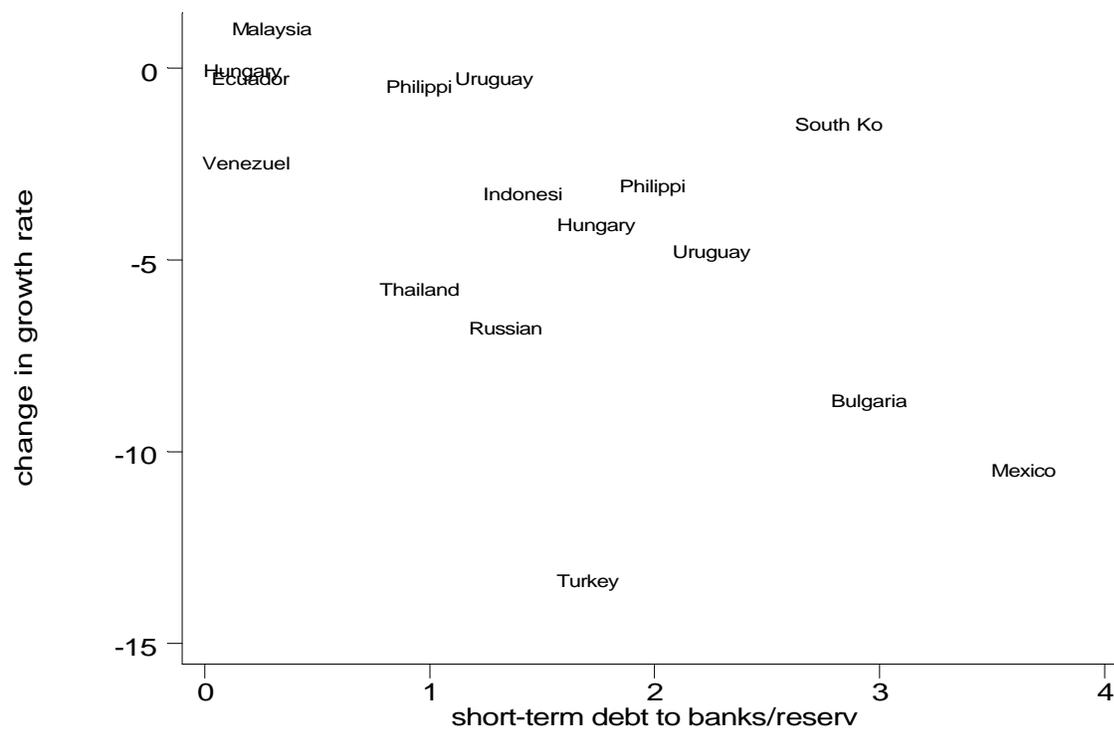
Note: Short-term debt exposure is lagged one year.
Each observation corresponds to a year of sharp reversal in capital flows, as defined in text:

Bulgaria   1990
Hungary   1990
Philippines   1990
Uruguay   1990
Uruguay   1993
Malaysia   1994
Turkey   1994
Venezuela   1994
Mexico   1995
Ecuador   1996
Hungary   1996
Indonesia   1997
Philippines   1997
South Korea   1997
Thailand   1997
Russian Feder   1998

Figure 4

Short term debt and currency collapse

short-term bank debt/reserves, end-
June 1997 (left axis)

depreciation of currency, second half
of 1997 (right axis)

Korea   Indonesia   Thailand   Philippines   Malaysia   Taiwan

Figure 5

Chile

Malaysia

Table 1

Composition of foreign debt by region

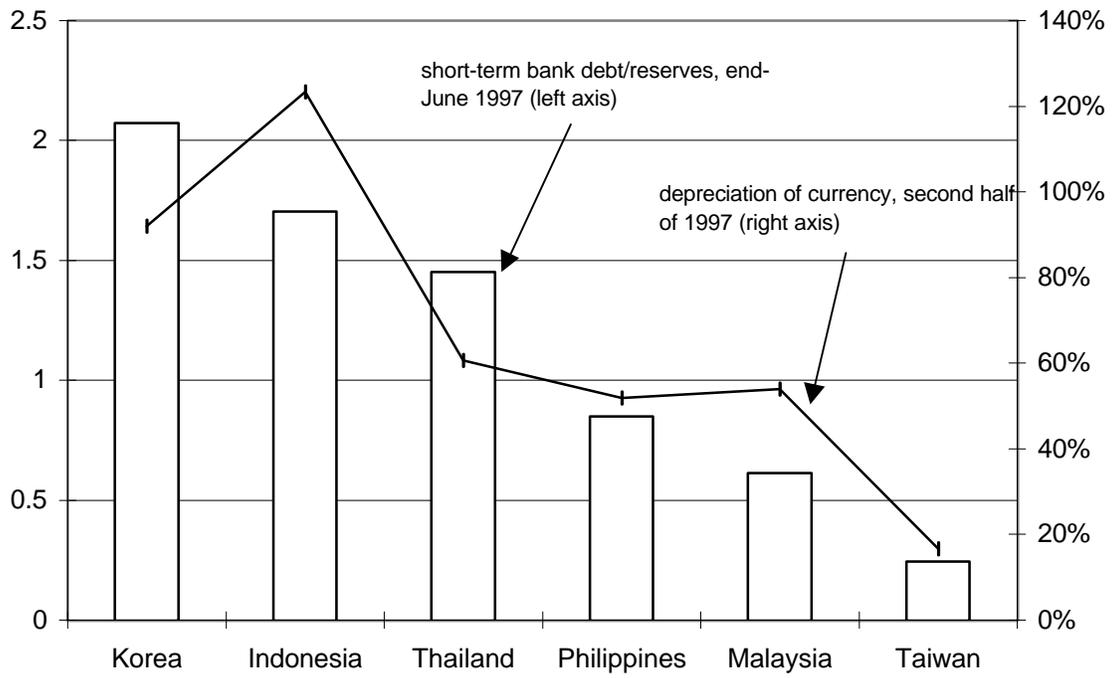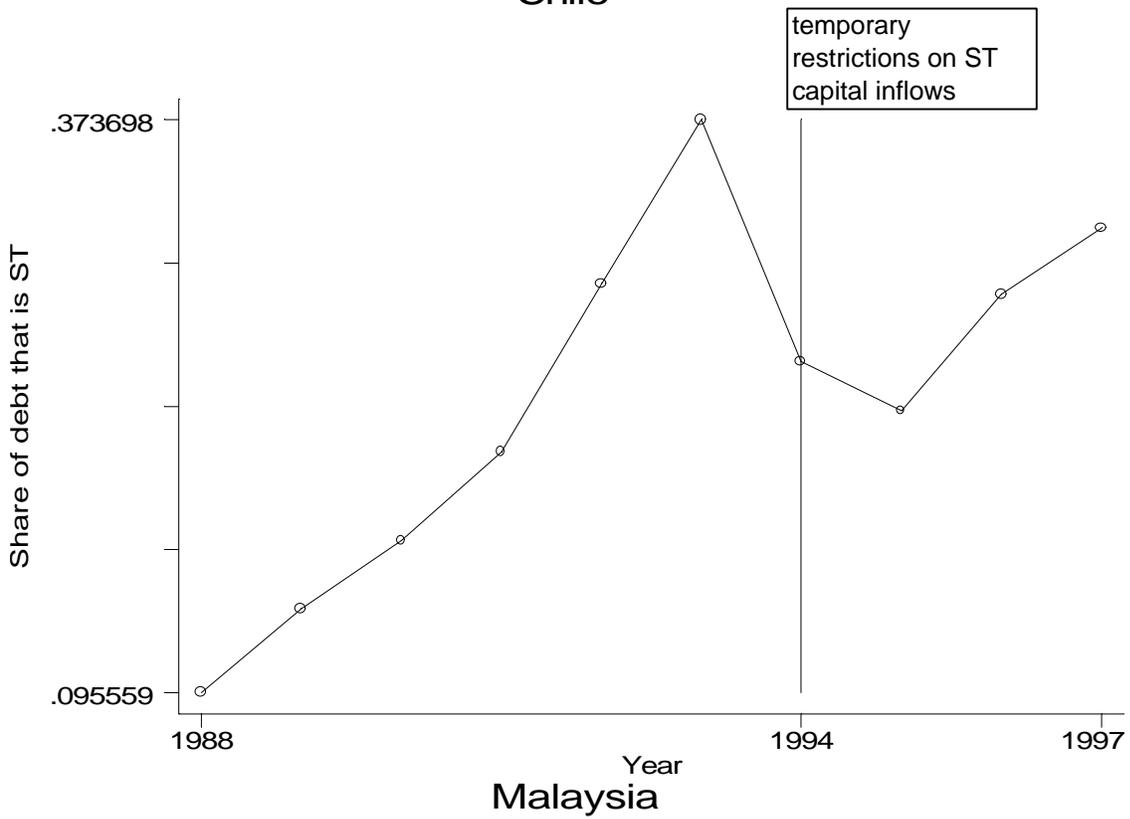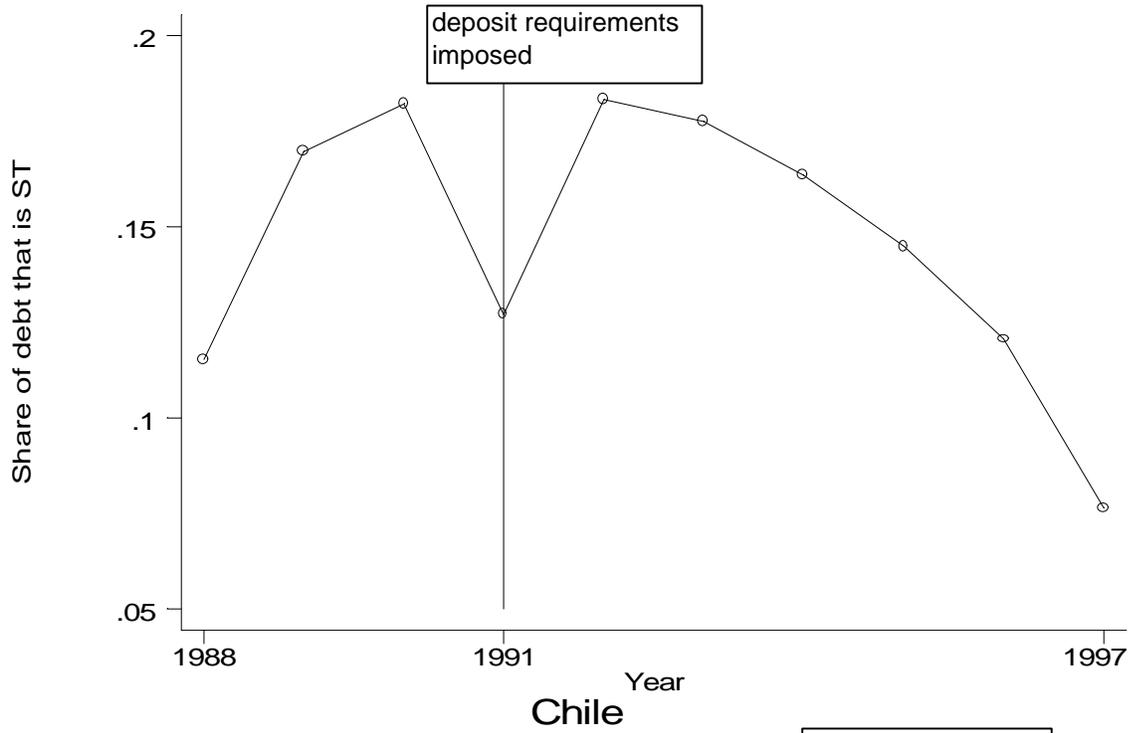|	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Asia/Pacific										
ST (commercial banks)	13.6%	14.8%	18.7%	20.3%	22.0%	21.8%	22.4%	26.0%	29.2%	23.8%
ST (other)	6.8%	6.6%	6.0%	6.0%	5.4%	6.4%	4.7%	4.3%	4.2%	4.0%
M&LT	79.6%	78.6%	75.2%	73.7%	72.5%	71.8%	72.9%	69.8%	66.6%	72.2%
Latin America										
ST (commercial banks)	9.3%	8.0%	8.9%	8.5%	10.3%	11.1%	12.4%	13.9%	15.0%	15.2%
ST (other)	3.1%	9.6%	9.4%	12.5%	12.7%	14.0%	12.4%	8.3%	6.9%	4.9%
M&LT	87.6%	82.4%	81.7%	79.0%	77.0%	75.0%	75.2%	77.8%	78.1%	79.9%
Europe										
ST (commercial banks)	9.7%	10.0%	9.4%	9.9%	9.5%	10.3%	6.4%	7.9%	10.0%	11.9%
ST (other)	5.3%	4.6%	7.4%	7.9%	7.8%	7.0%	5.6%	6.6%	8.7%	11.0%
M&LT	85.1%	85.5%	83.2%	82.2%	82.7%	82.7%	88.0%	85.5%	81.2%	77.1%
Africa/Middle East										
ST (commercial banks)	19.0%	18.9%	17.7%	14.7%	14.4%	14.0%	14.8%	13.4%	15.7%	16.1%
ST (other)	10.3%	10.2%	11.9%	12.8%	12.0%	11.5%	10.6%	10.8%	11.1%	12.6%
M&LT	70.7%	70.9%	70.4%	72.5%	73.6%	74.5%	74.6%	75.9%	73.2%	71.4%

Source: IIF (1998)

Table 2

Summary indicators on episodes of sharp reversal in private capital flows

country	year	reversal in private capital flows (% of GDP)	ST debt owed to banks		other ST debt	
			ratio to reserves	share of total debt	ratio to reserves	share of total debt
Russia	1998	n.a.	1.35	0.11	1.73	0.14
Indonesia	1997	5.02	1.41	0.26	0.29	0.05
Philippines	1997	7.08	0.95	0.19	0.30	0.06
South Korea	1997	10.99	2.82	0.62	0.02	0.01
Thailand	1997	10.53	0.95	0.36	0.07	0.03
Ecuador	1996	18.80	0.20	0.02	0.00	0.00
Hungary	1996	7.19	0.17	0.06	0.09	0.03
Mexico	1995	5.71	3.64	0.14	5.91	0.23
Malaysia	1994	19.90	0.30	0.22	0.21	0.15
Turkey	1994	11.05	1.70	0.16	1.26	0.12
Venezuela	1994	5.53	0.18	0.04	0.10	0.02
Uruguay	1993	5.43	2.25	0.15	5.78	0.38
Bulgaria	1990	5.99	2.95	0.25	0.84	0.07
Hungary	1990	9.41	1.74	0.11	0.91	0.06
Philippines	1990	7.35	1.99	0.09	2.92	0.14
Uruguay	1990	5.36	1.29	0.09	5.04	0.36
average		9.02	1.49	0.18	1.59	0.12
average for other cases		--	0.76	0.11	0.71	0.08

Source: IIF (1998) and authors' calculations. Debt ratios are lagged one year.

Table 3

Probit estimates of the determinants of capital-flows crises (1988-1998)

	dependent variable takes value of 1 in case of sharp reversal in capital flows								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dummy for ST debt to banks/reserves > 1	0.101 (3.79)								
share of ST debt to banks in total debt		0.216 (3.02)							
ST debt to banks/ reserves			0.052 (3.52)	0.053 (4.26)	0.041 (4.20)	0.041 (3.78)	0.030 (3.77)	0.042 (3.89)	0.033 (3.38)
ST other debt/ reserves			0.014 (1.91)	0.014 (2.76)	0.014 (3.80)	0.012 (2.61)	0.012 (2.61)	0.013 (5.43)	0.000 (-0.04)
MLT debt/reserves			-0.006 (-3.22)	-0.008 (-4.41)	-0.006 (-4.78)	-0.008 (-2.83)	-0.008 (-2.83)	-0.003 (-2.98)	-0.003 (-2.03)
debt/GDP				0.112 (3.33)	0.087 (3.18)	0.105 (2.55)	0.105 (2.55)	0.048 (2.04)	0.078 (2.18)
current account balance/GDP					-0.475 (-2.67)	-0.543 (-2.74)	-0.543 (-2.74)	-0.357 (-2.77)	-0.396 (-1.87)
real exchange rate appreciation (prev. 3 yrs)						0.036 (4.84)			
budget deficit/GDP							-0.003 (-1.32)		
M2/reserves								-0.003 (-1.57)	
increase in credit/GDP (previous 3 years)									0.000 (-0.72)
N	271	271	271	271	271	190	229	255	98
pseudo R^2	0.072	0.036	0.168	0.246	0.276	0.263	0.320	0.266	0.337

Notes: Coefficients shown are the changes in probability of crisis associated with changes in the independent variable (evaluated at the mean). Numbers in parentheses are the z-statistics associated with the underlying coefficient being zero. Estimated using maximum likelihood and correcting for within-group correlation. All independent variables are lagged one year unless specified otherwise
See text for explanation of dependent variable.

Table 4

Comparison of two crises: Korea in 1997 and 1980

	current crisis			
	1995	**1996**	**1997**	**1998**
CA deficit/GDP	-1.9%	-4.7%	-1.8%	13.2%
real GDP growth	8.9%	7.1%	5.5%	-7.0%
% depreciation of nominal exch rate	-1.8%	9.0%	100.8%	-29.0%
Total debt/GDP	26.1%	31.7%	34.6%	*n.a.*
Short-term debt/GDP	15.6%	20.0%	15.0%	10.3%
Short-term debt/reserves	217.6%	284.1%	325.2%	59.5%

	earlier crisis			
	1978	**1979**	**1980**	**1981**
CA deficit/GDP	-2.2%	-6.4%	-8.5%	-6.6%
real GDP growth	9.7%	7.6%	-2.2%	6.7%
% depreciation of nominal exch rate	0.0%	0.0%	36.3%	6.2%
Total debt/GDP	28.4%	31.3%	43.4%	46.5%
Short-term debt/GDP	6.3%	8.4%	15.0%	14.7%
Short-term debt/reserves	64.0%	96.7%	143.8%	148.7%

Table 5

Determinants of the maturity of external debt

| | dependent variable: ratio of short-term debt to total debt | | | | | | |
| | cross-section (1995) | | | | panel with fixed effects (1988-1997) | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log income per capita	0.083* (3.05)	0.078* (2.85)	0.105** (2.71)	0.083* (2.85)	0.143* (2.66)	0.196* (3.33)	0.216* (3.17)
M2/GDP	0.169** (2.45)	0.160** (2.22)	0.217** (2.70)	0.176** (2.43)	0.301* (3.28)	0.263* (2.84)	0.302* (2.73)
debt/GDP		-0.042 (-0.96)				0.131* (2.64)	0.177* (3.00)
TI corruption index			0.025 (1.20)				
imports/GDP				-0.053 (-0.47)			-0.17 (-1.13)
N	32	32	32	31	296	296	263
R^2	0.34	0.34	0.36	0.33	0.23	0.27	0.30

Notes: Numbers in parentheses are t-statistics calculated using robust standard errors. Fixed-effect regressions include fixed effects for both countries and years. R-squares for the fixed effects regressions refer to R-square (within). Asterisks denote level of statistical significance: * 99 percent; ** 95 percent.