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Chapter Author: Benjamin Hermalin, Andrew K. Rose, Peter M. Garber, Andrew Crockett, David W. Mullins, Jr

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# 7 Risks to Lenders and Borrowers in International Capital Markets

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1. *Benjamin E. Hermalin and Andrew K. Rose*
  2. *Peter M. Garber*
  3. *Andrew Crockett*
  4. *David W. Mullins, Jr.*
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## 1. *Benjamin E. Hermalin and Andrew K. Rose*

### 7.1.1 Introduction

This paper provides a framework for understanding the risks to borrowers and lenders in international capital flows. To isolate the features that are intrinsically international, we begin by analyzing the financial system in a purely domestic context. This allows us to focus on the extra effects associated with international activity.

All financial systems are fundamentally affected by two important and pervasive phenomena. First, borrowers and lenders are plagued by *asymmetric information*. Borrowers typically have better information about repayment prospects than do lenders, and they try to use this to their advantage. But lenders are aware of this risk and act accordingly, limiting their exposure and charging a premium for bearing this risk. The second fundamental imperfection is that borrowers cannot credibly commit to making repayments that lenders can collect at low cost. Since borrowers may choose to renege on their commitments, lenders bear the risk of not being repaid, but again, since lenders are aware of this possibility, *enforcement risks* end up being shared. Together, these

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frictions lead to low levels of financial activity, high interest rates, and insufficiently spread investment risks.

When we add the international dimension, both problems are exacerbated. Information is better inside countries than across international boundaries, and it is easier to use the legal system to back up contracts within a country than between countries. Consequently we expect to see relatively low amounts of international lending and borrowing, substantial premiums for international borrowing compared to domestic borrowing, and risks that are poorly spread across countries. Our framework makes it unsurprising then that we actually observe a low level of international (relative to domestic) financial activity. However, international lending can still be expected to occur between countries with dramatically different levels of wealth or different sources of systemic risk, or if competition from foreign capital improves the efficiency of the domestic financial system.

The differences between domestic and international financial systems are not merely microeconomic issues of information and enforcement. International capital flows are associated with two additional macroeconomic risks that are essentially absent in the domestic context. The first is *sovereign risk*; governments can choose to default on their international obligations. The second is the risk that international capital flows create macroeconomic instability through *monetary spillovers*. When capital flows internationally, the effects on the balance of payments spill out to the macroeconomy through the money supply and exchange rate, frequently with adverse effects.

In section 7.1.2 of the paper, we begin our analysis with a description of the financial system in a purely domestic setting. After identifying the fundamental sources of risk in this context, we move on in section 7.1.3 to an international setting. Section 7.1.4 provides an analysis of the macroeconomic effects of international lending that are absent in a purely domestic setting. The paper ends with a few brief conclusions.

### 7.1.2 The Domestic Financial System

We begin our analysis by considering the financial system at a relatively abstract level in a purely domestic context. This enables us to isolate the fundamental problems, which constitute extra risks to lenders and borrowers, that can, in principle, be avoided with a perfect financial system. In the next two sections, we consider what extra issues emerge in an international context.<sup>1</sup>

It is easiest to isolate the issues of interest with a thought experiment. Imagine an economy with a large number of farmers. The farmers are interested in borrowing seed (capital) to plant (invest) in their fields. A large number of individuals saving for the future are potentially interested in lending funds to the farmers, especially if the returns exceed the “safe” (risk-free) rate of return.

1. This section borrows from Eichengreen and Rose (1997) and Gertler and Rose (1994).

Consider, first, an idealized setting in which (1) all markets are competitive; (2) information is costless; and (3) borrowers and lenders can write credible contracts, guaranteed to be honored by both sides by a costless legal system, that cover all possible contingencies. The role of a financial system is to mobilize the savings of potential lenders and allocate these funds efficiently across the investment projects of potential borrowers. In our idealized economy, how well does the system work?

Flawlessly. In the frictionless setting, savers lend to farmers freely at the risk-free rate.<sup>2</sup> Market forces allocate the income of individuals efficiently between consumption and savings and then allocate savings across different farmers' investment projects. Each farmer borrows seed, signing a contract that specifies repayment plus interest to the lender under all possible circumstances. Since lenders compete to lend funds to borrowers, loan rates are driven down to the risk-free interest rate (arbitrage eliminates higher rates and no lender accepts less than the risk-free rate). Lenders do not have to worry about how much effort the farmer puts into tending crops—their repayment does not depend on the farmer's actions.<sup>3</sup> All farmers are able to borrow up to the point that the additional discounted expected return from capital just equals its price (the interest rate). There are no liquidity problems, and there is no need for precautionary savings. Government policy is unnecessary and would in general be counterproductive.<sup>4</sup>

This idyllic example is illustrated with dotted lines in figure 7.1. Perfect competition ensures that the supply of funds (measured on the  $x$ -axis) is flat at the risk-free rate, denoted  $r$  (interest rates are measured on the  $y$ -axis).<sup>5</sup> The demand for loans is downward sloping.<sup>6</sup> The point at which the two lines intersect gives the equilibrium quantity lent,  $x$ .

2. Given costless information, the farmers face an efficient market for insurance against the financial hazards incurred in farming (weather, price volatility, etc.). Hence, there is no reason for insurance to be bundled with financing. Since the farmers can obtain insurance and there is complete freedom of contracting, default risk is irrelevant in this idyllic setting. When, however, information is costly, economies of scale in information gathering can make the bundling of financing and insurance desirable vis-à-vis their separate provision. Consequently, we can expect to see lenders take on some insurance role through their willingness to face default risk. We develop this point in greater detail below.

3. The farmer's insurer will care about the farmer's efforts. Since, however, we are assuming costless information and freedom of contract, this will not pose a problem; i.e., there can be no moral hazard problem. Hence, any trade-off between insurance and incentives can be avoided.

4. If the rest of the world were also described by these assumptions, there would be no relation between domestic savings and investment; the identity and national origin of savers and borrowers would be irrelevant.

5. There is an implicit assumption that the market for farm capital is sufficiently small relative to the overall economy that the movement of funds to the farm sector does not cause the price of capital in other markets (i.e., the risk-free rate) to rise. I.e., we are assuming that *general* equilibrium effects are small.

6. This is a standard property of all factor demands.

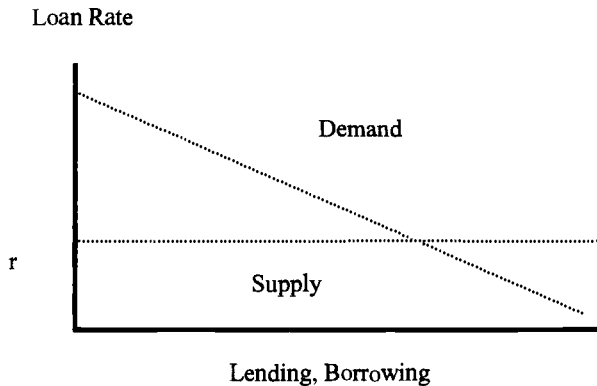


Fig. 7.1 Financial system with perfect information and credible commitments

#### Imperfect Information and Enforcement

Unfortunately, the idyllic situation portrayed in figure 7.1 is far from reality. Each of the assumptions we made is grossly unrealistic as a description of even advanced countries. There are barriers to entry in the financial system, information is unevenly distributed, and there are problems in enforcing contracts. Unsurprisingly, the predictions of the model are also not borne out in reality.

Our frictionless example is a poor description of reality for two fundamental reasons: imperfect information and difficulties associated with writing and enforcing contracts.<sup>7</sup> Information is costly to obtain, and the law imposes restrictions on the set of loan contracts that can be written (e.g., a debtor cannot waive his right to file for bankruptcy). Moreover, even within the set of legally enforceable contracts, the costs of using the legal system are high and uncertain.

The most critical legal limitations on loan contracts are those that limit the amount that can be seized from the borrower should the borrower default on the loan. Of these, the most important is the right to declare bankruptcy, which limits the debtor's liability. In the case of individual borrowers, personal bankruptcy laws, elimination of debtors' prisons, and prohibitions on slavery combine to make it almost completely impossible to seize the typical individual's most valuable asset, his human capital. In many states, his second and third most valuable assets—his house and car—also enjoy some protection against seizure.<sup>8</sup>

Limited liabilities laws and their ilk would not, per se, be directly relevant to lending in a world of full (symmetric) information. The borrower could take care of default risk by purchasing insurance from a third party, much in the

7. We think of imperfect competition in the financial system as being less important; it usually results either from policy or from information and enforcement problems.

8. See, e.g., Aghion and Hermalin (1990) for an economic analysis of such laws.

way some mortgage covenants require the borrower to obtain mortgage insurance and homeowner's insurance. In the real world, however, information is typically asymmetric, with the borrower having better information about his prospects than a lender or insurer. Here, default risk becomes directly relevant to lending. As is well known (see, e.g., Rothschild and Stiglitz 1976), when the insured have better information than the insurers—a situation known as *adverse selection*—insurance markets do not work efficiently. In particular, risks will not be fully insured. Consequently, a lender will ultimately face some default risk. This has a number of consequences for lending.

First, because the lender is exposed to default risk, the lender will have to charge a higher interest rate as a means of being compensated for bearing this risk. Hence, the interest rate will be higher than it would be absent default risk.

Second, because the lender will want to know the extent of this risk, the lender will be forced to acquire information about the borrower. Since information acquisition is costly, it is inefficient for two parties, the lender and an insurer, to both collect this information. Consequently, efficiency dictates that the supplying-of-funds function and the insurance function be bundled together by a single entity. That is, the interest rate is the sum of two prices: the cost of funds plus an “insurance premium” that the borrower pays the lender for the latter to assume the default risk. Moreover, because of asymmetric information, the borrower's total cost of borrowing (the interest rate plus the premium) will be greater than it would have been given symmetric information. Hence, the volume of lending will be less relative to a symmetric information world.

Third, lenders will tend to be “large.” Given that each loan is now risky, an individual would be reluctant to enter into a one-to-one lending arrangement; the individual would not want to absorb that risk. If, however, that individual pools his capital with the capital of others and this “syndicate” makes a variety of loans, they can diversify away much of the risk.<sup>9</sup> The need for financial intermediaries to be large, combined with government regulation of entry into this industry, will yield these financial intermediaries a certain degree of market power. Consequently, we can expect these financial intermediaries to price their loans above their cost, which will further reduce the volume of lending relative to a symmetric information world.

Fourth, asymmetric information can lead to both the misallocation of funds and an increase in interest rates due to a “lemons” problem (see Akerlof 1970). This problem is most readily illustrated by an example: Suppose that there are two types of farmers, high risk and low risk, who are equally represented in the population of farmers. A high-risk farmer will, with equal probability, produce either \$13 worth of output or \$0 worth of output. A low-risk farmer will produce \$7 worth of output with certainty. Observe that the low-risk farmer

9. Since there are also significant economies of scale in raising capital, providing banking services (e.g., an ATM network), etc., diversification is not the only motive for large financial intermediaries to arise, but it is, nevertheless, a significant one.

has the higher *expected* return. Both types of farmer have negligible capital and must borrow \$6 for seed. Although a farmer knows what type he is, a lender does not. Assume that the farmers are protected by limited liability—should they default on a loan the lender gets only the value of the output. Finally, assume the risk-free interest rate is 10 percent, so lenders will only make loans that have an expected value of at least \$6.60. In this situation, the lender will require a payment of at least \$8.80 to make a loan of \$6; otherwise, because of default risk, the lender will certainly lose money on average.<sup>10</sup> But since the low-risk farmer only earns \$7, he will certainly default; he would do better to exit farming and employ his negligible capital elsewhere—this despite the fact that were this a symmetric information world, he would want and could receive a loan of \$6. Recognizing that the low-risk farmer will exit the market, the lender will demand to be repaid at least \$13.20 to make a loan of \$6 (since it knows it will be lending to high-risk farmers only, who have a 50 percent default rate). But then the high-risk farmer will also certainly default, and he too would exit farming. Viewed another way, the farm sector is starved of capital and hence ceases to function. Observe that although the high-risk farmer would be excluded from borrowing under symmetric information (his expected return of \$6.50 means a lender could not earn a 10 percent return), the low-risk farmer would not. Hence, we see that asymmetric information will lead to higher interest rates and the misallocation of capital.<sup>11</sup>

Fifth, because the lender absorbs some of the risk—essentially provides partial insurance to the borrower—the borrower's incentives can be dampened. Because what the borrower receives in good (nondefault) outcomes is only a portion of his project's return, his incentive to work for good outcomes is reduced. A related problem is that because the borrower is not gambling with his own money, his incentive under worsening financial conditions could be to “double up” on his bets—attempt to borrow more or pursue riskier, asset-dissipating behavior—in a desperate attempt to generate cash. That is, because it's not his money on the margin, the desperate borrower feels no compunction against throwing good money after bad. Asymmetric information—the high cost of monitoring the borrower—makes it difficult for the lender to guard against such *moral hazard* problems.

Although the discussion so far paints a somewhat dire picture, it needs to be remembered that both lenders and borrowers can take measures to mitigate

10. Let  $B$  be the amount to be repaid (the face value of the debt). Suppose the lender could expect to receive  $B$  100 percent of the time from low-risk farmers (who make up half the population). Clearly, however, it can only expect repayment 50 percent of the time from high-risk farmers (who make up the other half of the population). Hence, its probability of repayment would be only 75 percent; so it would need to ask for a 33 percent premium to be insured against default risk (i.e.,  $.75 \times B \geq 6.60$  only if  $B \geq 8.80$ ).

11. If we changed the high-risk farmer's good outcome from \$13 to \$13.50, then the low-risk farmer, who would still have the higher expected return, would still be blocked from borrowing, but the high-risk farmer would now be able to borrow (at an effective interest rate of 120 percent). Here, then, capital would be diverted from a high-return use to a lower return use.

**Table 7.1** FDIC-Insured Lenders' Debt Collateralized by Real Estate

Year	Percentage
1995	21
1994	21
1993	22
1992	22
1991	21
1990	20
1989	19
1988	18
1987	17
1986	15
1985	13
1984	13

*Note:* The apparent trend toward increased collateralization with real estate may be misleading. Following the savings and loan (S&L) crisis of the 1980s, FSLIC, the deposit insurer of S&Ls, was eliminated and FDIC took over insuring S&L deposits. Since S&Ls do a higher proportion of their lending on real estate than banks, the apparent trend could be due to this change in the population mix, rather than to any trend in lending.

some of the problems caused by asymmetric information. Lenders can, for instance, monitor borrowers and employ methods of screening poor credit risks from good credit risks. They can also demand collateral (in fact, roughly 20 percent of lending by FDIC-insured institutions is collateralized with real estate—see table 7.1—suggesting the importance of limiting default risk in lending). Since lenders presumably undertake these measures to reduce the costs to which they would otherwise be exposed from asymmetric information, these measures should serve to lower the cost of lending relative to a situation of “pure” asymmetric information. We note, for later, that these methods often benefit from (and may even require) proximity between lender and borrower. Borrowers too can attempt to mitigate problems of asymmetric information by taking actions that signal information about themselves (such as offering collateral). Unlike lender screening and monitoring, however, signaling does not necessarily lower borrowing costs. The reason is that there is something of a “rat race” component to signaling; for a signal to convince a lender of the borrower’s creditworthiness, it may have to be “extreme.” Consequently, total borrowing costs (interest plus cost of signaling) can be greater than in a world in which borrowers are prohibited from signaling.<sup>12</sup> This further increase in borrowing costs will, of course, lead to even less borrowing and an even smaller capital market.

The information and enforcement frictions between lenders and borrowers lead to two general conclusions. First, borrowers will pay a premium for “external finance,” that is, noncollateralized borrowing. This premium compen-

12. See Aghion and Hermalin (1990) for details and examples.

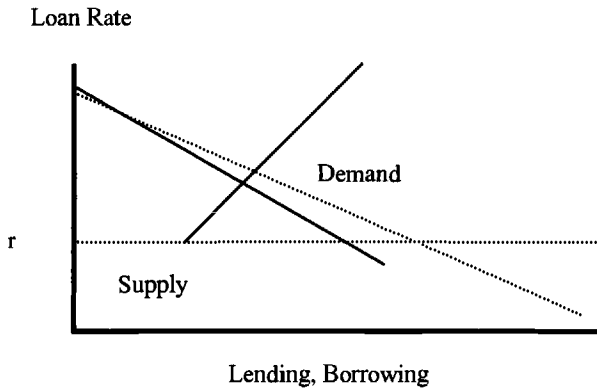


sates lenders for default risk, with the size of the premium being affected by the observable risk, the unobservable risk due to moral hazard, and the lemons problem (offset, somewhat, by the lender's efforts to screen for creditworthiness and monitor existing loans). Second, as a consequence, investors are able to borrow less than they would with perfect (symmetric information) financial markets. The scale of financial activity is smaller than it would be in the absence of these problems.

To make this more concrete, let us return to the farming example. Even with a perfect financial system, the harvest will be a result of many factors, some controlled by the farmer (e.g., the amount of effort spent tending the crops), some the result of the financial system (the amount of seed planted), and others more random still (weather). If it were costless to monitor the actions of farmers and to collect the payments specified in an all-encompassing and costlessly enforced contract, a saver could lend funds directly to farmers without any financial intermediary. In return, savers would receive a fixed return. But in reality, the farmer has better information than potential investors about soil quality, pest problems, and so forth. Furthermore, it is impossible to specify the amount of effort the farmer should apply in all circumstances; and even if it were, it would be impossible to monitor how much effort is actually applied. Court costs are far from negligible, and the farmer will also have the right to declare bankruptcy and walk away from his debt in sufficiently bad circumstances. Financial intermediaries, which can exploit economies of scale to reduce information and enforcement costs and can diversify risk, will come into existence—with possibly some reduction in lending competition—and all financial activity will be channeled through them; the cost advantage of intermediaries will eliminate direct loans from savers to borrowers. Intermediaries will only advance funds to a farmer at a loan rate higher than the risk-free interest rate. The farmer will accordingly borrow less than he would have chosen at a lower loan rate.

As a result, the investment decisions made by the farmer will depend on the farmer's financial situation. The farmer will first use internal funds to buy seed and only rely on external finance (e.g., bank loans) where necessary. The farmer will not maximize the value of the farm; crops will not be planted to the point where the risk-adjusted cost of funds equals the marginal expected gain from planting seed. Investors and farmers, consequently, lose out on profitable investment opportunities not undertaken, and the farmers further lose in that they bear too much idiosyncratic risk.

The effects of asymmetric information and enforcement problems are readily observed in figure 7.2. Both the demand for seed capital and the supply of savings are affected; the more realistic schedules are portrayed with solid lines (otherwise the figure is identical to fig. 7.1). The supply of funds is unaffected at low levels of lending activity. Up to the point of the farmers' collateralizable net worth, farmers can simply self-finance investment projects or



**Fig. 7.2 Financial system with imperfect information and enforcement problems**

provide collateral for any net borrowing.<sup>13</sup> But after this point, finance from other lenders—“uncollateralized external finance”—is required. Assuming a decreasing-returns-to-scale screening and monitoring technology, the supply curve then rises, reflecting the rising marginal cost of originating loans. The demand curve shifts in as well, since signaling behavior and the removal of full insurance raise the farmers’ cost of borrowing.

### Policy

Policy toward the financial sector matters because it can make business more or less costly for financial intermediaries. The more costly lending is, the greater the premium intermediaries will demand and, as the price of funds increases, the less borrowing there will be.

Policy can also protect—or harm—the precarious balancing act financial intermediaries must perform: The fact that their assets (deposits) are less liquid than their liabilities renders their financial condition delicate, and confidence is thus essential to their stability. If confidence wanes for any reason, the fact that demand for funds is met on a first-come, first-served basis gives creditors an incentive to liquidate their deposits at the first sign of trouble. Such a run means a contraction of lending activity.

For these reasons, governments wish to avoid disruptions in the financial sector. A number of standard policies can be taken to strengthen the financial sector. These include (1) deposit insurance for banks, (2) reserve requirements, (3) capital requirements, (4) restrictions on the riskiness of assets held by financial firms, (5) direct supervision, and (6) provision of lender-of-last-resort facilities. These policies can help to ensure the stability of the financial sector,

13. However, self-financing means that farmers may bear too much idiosyncratic risk.

thereby reducing the underlying enforcement and information problems. By reducing risks they can encourage more efficient, inexpensive, and widespread financial activity.<sup>14</sup>

### 7.1.3 How Does International Lending Exacerbate Information and Enforcement Problems?

Both of the fundamental problems we encountered in the financial system are exacerbated when we consider international lending. Local intermediaries are likely to have better information about local investment opportunities and risks than foreign intermediaries; they are also more likely to know how to squeeze payments from local borrowers.<sup>15</sup> In contrast, foreign intermediaries suffer from less information; hence, the problems of asymmetric information discussed above will be worse than for domestic lending.

The history of financial intermediation in the United States offers some evidence that domestic lenders have advantages over foreign lenders. Although partly due to restrictions on interstate banking and state restrictions on branch banking, most credit organizations in the United States have tended to be local operations despite the obvious risk reduction advantages to geographic diversification. This was undoubtedly due to the high cost of obtaining information about geographically distant borrowers.<sup>16</sup> Indeed, even *social* distance proved sufficient to restrict many savings and loan societies to operating within a single local immigrant group. More recently, evidence from the operation of savings and loans in the 1980s finds that those that made “long-distance” loans were outperformed by those that did not.<sup>17</sup>

A related problem is that foreign intermediaries often must compete against domestic intermediaries. As we have just noted, domestic intermediaries will have an information advantage vis-à-vis their foreign competitors. There are two consequences of this advantage. First, domestic intermediaries will, for reasons discussed previously, enjoy a cost advantage over foreign intermediar-

14. Of course, such policies can have inadvertent and perverse consequences. E.g., providing deposit insurance reduces the incentives of depositors to monitor intermediaries' activities. In addition, deposit insurance—coupled with limited liability—turns intermediaries into giant “put options” for shareholders: the shareholders receive the upside gain but can “put” the intermediary to the deposit insurer in bad states. This can lead intermediaries to behave in a *risk-seeking* manner with corresponding inefficiencies and misallocations of resources (for empirical estimates of this effect in the context of U.S. savings and loans, see Hermalin and Wallace 1994, 1997).

15. This point is often made in the development literature, where it is argued that a good way to deliver credit to rural farmers is to use village elders and chieftains as agents because of their superior knowledge of creditworthiness and their greater ability to force repayment (e.g., by threatening social sanctions). See Fuentes (1996) for more on this point, as well as references to empirical confirmation.

16. This could also reflect *within-firm* information problems exacerbated by geographic distance (e.g., it could be harder to control a local agent of the firm the farther he is from headquarters).

17. See Hermalin and Wallace (1994) for evidence on this matter.

ies. This allows them to be tougher competitors, which squeezes the foreign intermediaries' profits. Indeed, the cost advantage could be sufficient that foreign intermediaries are unable to capture enough of the market to cover the fixed costs of entry, so they are kept out of the domestic credit market altogether. The second consequence is that because a domestic intermediary is able to offer better rates than a foreign competitor, foreign competitors will be second-choice lenders for domestic borrowers. That is, foreign intermediaries could face an adverse selection of borrowers who have been denied credit by the better informed domestic intermediaries. This adverse selection means that foreign lenders are exposed to even greater risk.

There is some empirical evidence to support these conjectures. When U.S. savings and loans were allowed by deregulation to pursue lines of business previously restricted to commercial banks, those that took advantage of these new powers were greatly outperformed by those that chose to stay with traditional lines of business.<sup>18</sup> A plausible interpretation of this result is that those savings and loans that strayed from traditional lines had an information disadvantage vis-à-vis commercial banks. Consequently, they made lower profits and suffered higher rates of loan defaults.<sup>19</sup>

Given these information disadvantages faced by foreign lenders, the observed low levels of international financial activity seem unsurprising. This is especially true when we add the impact of enforcement problems.

Enforcement can be harder across international borders than within national boundaries. First, an alien legal system means that a foreign lender's domestic expertise on enforcement is of lower value; the foreign lender may, therefore, need to make expensive investments in acquiring the necessary expertise or become reliant on expensive local expertise. Second, in countries where the rule of law does not always function well, such as some developing countries or some postcommunist states, enforcement can be hampered by the borrower's ability to employ extralegal methods to deter enforcement (harass auditors, spirit assets away, etc.). Third, the legal system could exhibit a nationalistic bias, making enforcement by a foreign lender more difficult than it would be for a domestic lender.<sup>20</sup> These problems add either directly to the foreign lender's cost of lending or, by increasing the foreigner's risk, indirectly to the cost of lending. Higher costs, in turn, mean the foreign supply of funds shifts in, raising the interest rate and lowering the total amount of lending.

A further problem with international lending is that international banking policy is less well developed than domestic banking policy. Many of the policy

18. This result controls for pre-deregulation performance, so this is not the case of incompetent thrifts, unable to compete in their traditional lines, going looking for greener pastures.

19. See Hermalin and Wallace (1994) for a complete discussion.

20. This is a problem within the United States in lender liability suits where juries often favor local debtors (the plaintiffs) against distant banks (the defendants). See Fischel (1989).

institutions that serve to reduce the risks in the domestic financial sector do not exist at the international level.<sup>21</sup> Deposit insurance, for instance, is essentially absent internationally.<sup>22</sup> Lender-of-last-resort facilities are a very uncertain business at the international level.<sup>23</sup>

On the other hand, financial intermediaries can benefit from a lack of regulation. Government-imposed reserve requirements and bank supervision are largely absent at the international level, and requirements on capital adequacy and asset riskiness are much more difficult to monitor. This gives intermediaries greater flexibility, which, in theory, should allow them to make greater profits. The U.S. experience with savings and loan deregulation, however, suggests that greater flexibility may not be associated with greater profits in practice. The reasons for this are relevant to international lending. Intermediaries may respond to greater flexibility by rationally pursuing riskier strategies; but then the rate of failure can be expected to go up. Because intermediaries are themselves debtors (their deposits, recall, are loans from depositors) protected by limited liability, they receive upside gains but can walk away from downside losses. This, in turn, can give them *risk-seeking* preferences; that is, they could prefer a lower expected return, but riskier venture to a higher expected return, but safer venture.<sup>24</sup> Consequently, average returns could be lower than they would have been under tighter regulation.

In addition, the perception that international financial activity is risky may become a self-fulfilling prediction if governments create barriers to international capital flows. Historically, many governments have viewed international borrowing and lending as a source of more risk than opportunity and have accordingly erected international capital flow barriers.

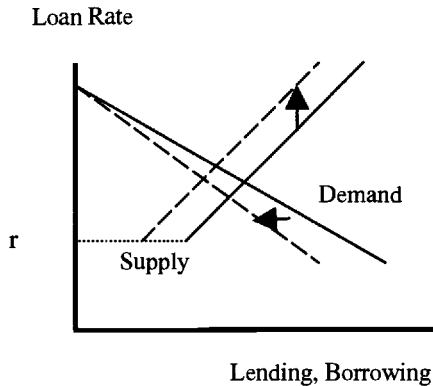
The effects of international lending can be portrayed using the same conceptual apparatus as we applied in section 7.1.2. To clarify things, figure 7.3 illustrates the effects of allowing either only domestic *or* foreign lending to finance investment projects. Both information and enforcement problems are exacerbated by international lending; the relevant demand and supply schedules are graphed with dashed lines. The supply curve is higher and to the left of the domestic case, since the collateralizable net worth of the borrower is lower to foreign lenders than it is to domestic lenders (because of additional enforce-

21. The absence of these institutions is part of the *raison d'être* for the offshore financial sector. "Eurobanks" began to flourish in part because of the cost advantages that stemmed from the lack of regulation and reserve requirements.

22. This may also restrict foreign lenders to lending domestically raised funds. Since the source of funds is not as well diversified as it would be were the lender able to attract nondomestic funds, the lender is exposed to greater risks—such as duration mismatches—which raises its cost of business (although this cost is incurred regardless of where it lends).

23. While the Basle Committee has improved the supervision of multinational banks (most famously of late through bank capital measures), there are still many ambiguities, especially in the lender-of-last-resort facilities.

24. Hermalin and Wallace (1994) found evidence that deregulation resulted in many thrifts' switching to riskier, but lower expected return lines of business from their traditional lines of business.



**Fig. 7.3** Financial system with only foreign lending

ment and information problems). If borrowers are further restricted in the amount of insurance they are allowed to purchase, they may react to this increased risk bearing by reducing their demand for funds, shifting the demand curve in.

The differences between international and domestic financial activity are simply a matter of the degree to which information and enforcement problems bite. They need not be large; indeed, they need not exist at all. In principle, both enforcement and information problems could be less serious for international lending.<sup>25</sup> Still, the fact that international capital flows have historically been small—see tables 7.2 and 7.3 for evidence, and chapters 1.1 by Edwards, 3.1 by Ito, and especially 5.1 by Tesar in this volume—is consistent with our arguments that enforcement and information issues are worse for international lenders.<sup>26</sup>

International lending is more difficult than purely domestic lending; but international capital flows do exist and are in fact growing more rapidly than purely domestic activity. Why? The situation portrayed in figure 7.3 is too pessimistic since it ignores two important factors. First, it compares two different supply curves—one with only domestic savings, the other with only foreign savings. In reality, countries that allow international capital flows can finance investment projects with either or both. In this case, the aggregate supply-of-savings curve is unambiguously flatter than the purely domestic curve.

25. It is easy to think of counterexamples. Foreign expertise about export sectors can easily be superior to domestic information. Investors in recently deregulated or emerging sectors may benefit from foreign experience, providing an information advantage to foreigners. And foreigners may find governments and judicial systems more sympathetic to their claims than to those of domestic residents.

26. Table 7.2 contains data on the outstanding stocks and new issues of domestic debt in the OECD countries; table 7.3 contains the analogous data on international debt. While there are technical problems involved in a direct comparison, there seems to be little doubt that the overwhelming amount of financial activity is purely domestic in nature.

**Table 7.2** Stocks and Net Issues of Domestic Debt (billions of U.S. dollars)

Country	1993	1994	1995
Total OECD*	19,714.5	22,171.4	24,110.0
United States	9,340.2	9,963.1	10,726
Japan	3,976.7	4,750	4,958.6
United Kingdom	440.8	524.6	598.7
Canada	469.6	463.6	503.3
Net issues	1,604.4	1,474.4	1,680.3

Source: Ito and Folkerts-Landau (1996, 59).

\*Excluding Iceland and Turkey.

**Table 7.3** Stocks and Net Issues of International Debt (billions of U.S. dollars)

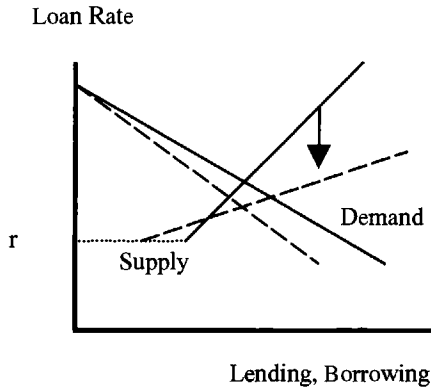
Country	Stocks			Net Issues, 1995
	1993	1994	1995	
All countries	2,037.8	2,441.7	2,803.3	313.2
Industrial	1,650.3	1,976.4	2,277.8	261.8
United States	176.9	209.3	272.8	60.6
Japan	340.1	360.6	356.7	7.3
Developing	121.8	162.1	192.9	31.3

Source: Ito and Folkerts-Landau (1996, 57).

Allowing capital flows can only reduce capital market imperfections, lowering interest rates and raising lending activity.

Second, the situation portrayed in figure 7.3 implicitly compares two identical countries. But countries differ in many ways; some—developing countries in particular—are capital poor. A small developing country with a relatively low endowment of capital faces a steeper supply-of-domestic-funds curve than it does if foreign capital is allowed to flow in. Since Northern countries are well capitalized, they will tend to have fewer investment opportunities with high rates of return, as most such opportunities are exploited as they emerge. Hence, the North will be willing to lend funds at a rate of return lower than required by Southern residents. Foreigners need not even be better endowed with capital if their presence creates more competitive domestic capital markets. And the systemic risks that affect countries can be different, providing a potentially important argument for international diversification. As a result, interest rates can fall and loan activity rise with international capital flows.

Figure 7.4 provides an illustration of this case for a capital-poor country or a country with an uncompetitive domestic financial sector. As in figure 7.3, to clarify the argument we compare financing all investment projects with either domestic or foreign savings. Because of information and enforcement problems, foreigners have access to a lower level of collateralizable net worth; the



**Fig. 7.4** Foreign lending for a capital-poor country

foreign supply curve starts to rise at a lower level. On the other hand, since foreigners have a larger (or more competitive) financial system because of their abundance of capital, the foreign supply curve is flatter than the purely domestic supply curve.<sup>27</sup> The net result is ambiguous. Interest rates may be lower and total financial activity higher with only foreign finance, as depicted. If the country is relatively well endowed with capital, or the domestic financial system is relatively efficient, then the more pessimistic situation of figure 7.3 will prevail.

It is not unreasonable to assume that foreign capital systems are more efficient than domestic financial structures in many countries. Offshore capital markets are large and very competitive, as can be seen in tables 7.2 and 7.3. International financial activity is large compared to domestic financial sectors for all except the largest industrial countries.

Finally, we should not forget that because foreign lending offers intermediaries geographic diversification of their loan portfolios, an intermediary in country A could value a loan in country B more than a country B intermediary.

The growth of international capital flows is, arguably, a manifestation of policies that have systematically reduced information and enforcement problems. For instance, the Bank for International Settlements (BIS) rules can be viewed as an attempt to reduce information problems on the strength of banks viewed from an international perspective. The accession of countries to the international economic community—say by membership in the International Monetary Fund (IMF), the World Trade Organization, and regional trade agreements—can be viewed as devices to lower enforcement costs. In addition, policies that allow for foreign control of domestic intermediaries mean that capital-rich foreign intermediaries can more easily team up with expertise-

27. Foreign capital may also be supplied more elastically than domestic capital if systemic risks vary by country, so that international diversification effects are important.



rich domestic intermediaries, and this control means they can reduce their risks.<sup>28</sup> Finally, although not solely the result of government policy, high-speed computers, a globally improved telecommunications infrastructure, and greater competition in transportation have reduced the costs of long-distance monitoring and screening of loans.

In summary, two fundamental problems are responsible for imperfect financial systems: imperfect information and the difficulty of writing credible and enforceable contracts. Foreigners are likely to have worse information about domestic investment projects; they are also likely to find it more difficult to write enforceable contracts at low cost. Since foreign intermediaries are usually at a disadvantage compared to domestic intermediaries, we would be surprised to see large amounts of international financial activity. There are, however, three caveats: large differences in capital abundance, a desire for systemic risk diversification, and an inefficient domestic financial structure can all induce large capital flows.

#### 7.1.4 Macroeconomic Aspects of International Lending

We have discussed the financial imperfections at the heart of financial systems from a purely microeconomic viewpoint thus far. But an internationally integrated financial system also differs from an autarkic domestic system in two important macroeconomic aspects. First, borrowing countries can choose to default on foreign debt. The possibility of *sovereign risk* must be taken into account by potential lenders. Second, the domestic monetary regime is strongly affected by the presence of capital flows. This also has important implications for the monetary system of a recipient country, adding *monetary instability* to the potential risks borne by borrowers.

##### Sovereign Risk

In any society, firms and individuals occasionally find themselves unable or unwilling to meet their financial obligations, often for reasons beyond their control. A declaration of bankruptcy typically then gives creditors the right to seize the assets of the debtor. Sovereign risk differs from ordinary bankruptcy risk because enforcing this right beyond the jurisdiction of the creditor's government requires the cooperation of another government (Eaton 1990). If the defaulting agent is itself a government, it is unlikely to hand over domestic assets to foreign creditors, and those creditors will have little or no legal recourse. Sovereign risk constitutes an important impediment to international financial activity.<sup>29</sup>

28. In particular, the foreigners can reduce the "agency" problems—insufficient screening and monitoring by the domestic intermediary, misallocation of funds, etc.—that could arise in an arm's-length relationship. It is, however, reasonable to expect that even *within*-intermediary agency problems could be exacerbated by geographic distance (consider, e.g., Nick Leeson and Barings Bank). For more on agency issues, see Williamson (1985).

29. In a theoretical sense, sovereign risk can be viewed as an enforcement problem.

**Table 7.4** Countries in External Payments Arrears, End of 1995

Albania	Egypt	Russia
Angola	Equatorial Guinea	Rwanda
Antigua and Barbuda	Eritrea	São Tomé and Príncipe
Azerbaijan	Ethiopia	Senegal
Belarus	Guatemala	Seychelles
Benin	Guinea	Sierra Leone
Burkina Faso	Guinea-Bissau	Sudan
Cameroon	Jordan	Suriname
Cape Verde	Kenya	Syrian Arab Republic
Central African Republic	Liberia	Tajikistan
Chad	Mali	Tanzania
Comoros	Mauritania	Turkmenistan
Congo	Myanmar	Ukraine
Costa Rica	Nicaragua	Venezuela
Côte d'Ivoire	Niger	Vietnam
Croatia	Panama	Zambia
Dominican Republic	Paraguay	
Ecuador	Peru	

Source: IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions* (Washington, D.C., 1996).

Table 7.4 contains a list of countries in official payments arrears at the end of 1995, as tabulated in the IMF's 1996 *Annual Report on Exchange Arrangements and Exchange Restrictions*.<sup>30</sup> Long as this list is, it still understates the importance of sovereign risk. First, the very threat of sovereign risk has reduced international lending. Second, the list does not account for the effects of external rescue packages of the sort that prevented defaults by, for instance, Mexico and Argentina in 1994–95 and Thailand and Korea in 1997. Third, arrears have been much higher in the recent past, as any bank exposed to Latin debt in 1980s is painfully aware.

The possibility of sovereign default is clearly an important risk borne by international borrowers and lenders. Still, it must be of limited importance in practice; if it were not, debtor countries would never pay back foreign creditors. Since repayment is the norm, there must be important reasons for governments not to default. What are they?

One way to limit sovereign default risk is for creditors to threaten to seize the overseas assets of debtor countries. This incentive is of obviously limited importance if the borrower is a net debtor.<sup>31</sup>

A more important reason why debtor countries continue to pay their international obligations is that creditor countries can refuse to engage in trade with

30. External payments arrears include arrears that have been caused by exchange restrictions on current payments or transfers, as well as overdue arrears on financial obligations of which the obligor is the government or a resident in the country in question.

31. A "common pool" problem could also exist: if there is more than one creditor, a given creditor can be frozen out if other creditors attach the overseas assets first. Although this does not affect the deterrent effect of seizure for the debtor nation, it does increase the risk for its creditors.

debtors. Trade credit can be cut off, boycotts begun, and goods can be seized, thereby reducing the welfare of debtor countries.<sup>32</sup> Such sanctions can be important, especially for small countries with large gains from trade. Still, these sanctions are also limited in scope, since creditor countries also lose from disruptions in international trade. Creditor countries may lack the will to impose sanctions, particularly when the trade sectors have more political clout than the financial sector. Furthermore, to be most effective, the creditor countries must put up a common front; however, the temptation to cheat on such a boycott could be large (particularly when the exports of the creditor countries are in competition), making united action difficult. Finally, the trading partners could not all be creditor countries, which would mitigate the disruption (e.g., the defaulting nation could find substitute providers of critical imports and it could use these other trading partners to transship goods).

Another potential way to limit sovereign risk is for lending countries to diversify their risks by spreading loans across debtor countries. Complete diversification, however, requires negative correlation across default risks (e.g., as default risk in Mexico increases, default risk falls in Brazil). Yet, as shown by the Latin American experience of the 1980s, positive correlation would seem more likely than negative correlation.

An often-cited limit to sovereign risk is the “reputation effect.” A country that anticipates needing foreign capital in the future will find it easier to borrow if it earns a reputation as a good credit risk by continued repayment.<sup>33</sup> After all, defaulting countries can be cut off from future borrowing by creditors or charged higher rates of interest than they would otherwise face. The empirical importance of this seems dubious, however. Many countries have defaulted on their international obligations only to reenter international credit markets shortly thereafter; the most dramatic recent examples are the Latin countries since the debt crisis of 1982.<sup>34</sup>

Yet, reentry into the credit markets does not necessarily disprove the logic of the reputation effect. While it is true that early game-theoretic models of the reputation effect assumed infinite punishment of transgressors (i.e., being infinitely barred from borrowing),<sup>35</sup> more recent models have realized that the logic applies even if the penalties are of finite length. In particular, if the transgressor plays a “penance strategy” (i.e., inherently suffers from its transgres-

32. The limiting case would be for the creditor country to make political threats; i.e., sovereign default can be met by gunboat diplomacy. For various reasons, this limit is rarely reached these days.

33. Important to this discussion is the assumption that the debtor nation wishes to remain in the international financial community. The literature has also considered the situation in which a debtor nation has the alternative of entering financial autarky. In our analysis, we assume that no debtor nations would actually find it in their interest to enter into such a state.

34. At a more abstract level, Bulow and Rogoff (1989) have shown that it is not generally worthwhile for small countries to establish a reputation for repayment.

35. A “grim strategy.” For more on the game theory behind reputation effects, see Fudenberg and Tirole (1991).

sion), then the punishment phase need last only a short time. Given the financial disruptions associated with a major default, it could be argued that something resembling a penance strategy is being played after a default, which could help to explain why defaulting countries are soon welcomed back by the international financial community.<sup>36</sup> In short, then, reputation effects serve as a principal—but by no means perfect—way of enforcing repayment.

If reputation effects are indeed important, it might seem strange that we ever see sovereign default. In particular, why can't the creditor and debtor renegotiate when default is anticipated, thereby avoiding the costs incurred by actually defaulting? In fact, we do observe such negotiations in many instances (the equivalent of private workouts in the domestic context). A case could even be made that were creditor and debtor *symmetrically* informed about the debtor's circumstances, we should always see renegotiation rather than default. The problem is that once again asymmetric information makes it difficult for the debtor to communicate its circumstances convincingly. Consequently, the creditor worries that the debtor is trying to get away with repaying less than it actually could. The creditor, therefore, takes a harder stance in many instances than is warranted, leading ultimately to a default. Although the parties have an incentive to cooperate—analogously to partners in a game of bridge—they misread each other's signals, resulting in disaster. Nonetheless, the ability to renegotiate in advance of default can lessen the costs of default and reduce the impact of sovereign risk. Moreover, as the creditor's information about the debtor improves, this risk-reducing benefit is enhanced.

In summary, sovereign risk is a significant problem in international lending, one without an obvious analogue in domestic lending.<sup>37</sup> Direct enforcement is impossible. Direct punishment (seizing the debtor nation's assets abroad, trade boycotts, gunboat diplomacy, etc.) is likely to be applied in a haphazard way, at best, and so create few incentives for debtor nations to repay. The primary incentive, therefore, for repayment is reputation effects. In a world of certainty and symmetric information, reputation effects would be sufficient to deter all default; however, in the real world of uncertainty and asymmetric information, defaults will still occur.

### Monetary Spillovers

In an autarkic country, the monetary regime is controlled by the central bank. The level of interest rates (the "risk-free" rate in the discussion above) is

36. Another, technical point is that much of the early reputation models predicted that there would be no transgressions in equilibrium. More recent work on "trigger strategies" has developed models in which, due to uncertainty, some transgressions occur in equilibrium (see, e.g., Green and Porter 1984).

37. Actually, given the rules of Chapter 11 bankruptcy, it could be argued that the managers and shareholders of a company in debt have some ability to frustrate their creditors' attempts to seize assets in the case of default. After default, a company coming out of Chapter 11 is often like a defaulted debtor nation; both are allowed to return to the capital markets. In this way, sovereign risk might not be so different from the risk faced in the domestic context.

determined by the authorities; additional risk premiums that compensate for information and enforcement problems are determined by market forces. The aggregate level of short-run real interest rates is a purely domestic matter.<sup>38</sup>

The situation is dramatically different in a country with free international capital mobility. While foreign capital can provide a healthy tonic of competition for domestic financial markets, it also compromises the ability of the central bank to conduct monetary policy from a purely domestic perspective.

The relationship between international lending and macroeconomic instability stems from two simple relations. First, the domestic monetary base—the most important component of the aggregate money supply—is composed of domestic credit and international reserves. Second, the balance-of-payments accounting identity links international flows of goods, services, and capital to changes in international reserves. Exogenous foreign shocks result in capital flows that lead to shifts in reserves and corresponding movements in the domestic money supply and the macroeconomy.

To make this concrete, consider a country's balance of payments:

$$\text{Current account} + \text{Net capital flows} = \text{Net reserve flows.}$$

Countries with net capital inflows that more than compensate for any current account deficit are in "balance-of-payments surplus" and experience rising levels of international reserves. But reserve flows are linked to the money supply since

$$\text{Money supply} = \text{International reserves} + \text{Domestic credit.}$$

So increases in international reserves lead to increases in the money supply, unless they are deliberately counteracted by the monetary authorities. The greater the degree of capital mobility, the faster and larger the reaction of net capital flows and the greater the impact on the money supply. Since the money supply is an important determinant of macroeconomic stability, undesired capital flows can compromise macroeconomic performance.

The first fundamental choice for a country with a nonzero balance of payments is whether to stem the imbalance or allow it to continue. For the sake of simplicity, we consider the case of a country with net capital inflows, which results in increasing international reserves.<sup>39</sup> To further sharpen our focus, assume too that the current account is balanced, and capital begins to flow into a country for purely foreign reasons.<sup>40</sup>

Allowing the capital to flow in might seem, at first blush, to be the obvious choice. After all, the country receives international reserves that can be kept for many purposes (e.g., defending the country's currency in the future). But the increase in international reserves raises the money supply if domestic credit

38. We assume that the monetary authority cannot alter real interest rates in the long run.

39. A number of Latin and Southeast Asian countries have been in this situation in the 1990s.

40. The first assumption is made purely for convenience; the second is far from uncommon. For instance, the reduction of capital flows to Mexico resulting from increases in American interest rates is often viewed as an underlying cause of the 1994 Mexican crisis.

policy is left unchanged. This loosening of monetary policy can result in undesirable future inflation. It can also fuel bubbles in asset prices, especially stock, bond, and real estate prices. If domestic banks become heavily exposed to asset price risk, either through design or neglect, popping asset bubbles can bankrupt the financial system, as Sweden and Japan found out in the early 1990s and Thailand more recently.

Still, even if the payments imbalance is allowed to continue it need not result in looser monetary policy. The central bank can offset increases in international reserves with a decline in domestic credit, usually sales of government bonds. This “sterilization” of reserve movements is not without its own perils though. Reductions of domestic credit tend to keep interest rates high. Since the government pays a higher interest rate on its bonds than it receives on its foreign (reserve) holdings, sterilization represents a nontrivial cost to the government. Sterilization also encourages continued capital inflows, so that the cause of the problem—the payments imbalance—persists. Further, sterilization is at best only a temporary policy, since it is naturally limited by the size of the credit base. The evidence to date indicates that while there is some scope for sterilization in the short run, there are few indications that sterilization is a viable policy over long periods of time.<sup>41</sup>

A third problem of allowing capital inflows to continue is that the international borrowing has to be repaid in the future (ignoring the sovereign risk considerations discussed above). Wisely invested, foreign capital can yield returns that pay back the original lenders while also providing domestic benefits. But if borrowing from abroad is used to finance consumption, perhaps by delaying painful but necessary fiscal adjustments, then repayment can be more difficult. Investing foreign capital in unprofitable projects with low returns is little better, as many Asian countries discovered in 1997.

Finally, it is always wise to remember that what has flowed in can also flow out. Foreign capital has an awkward habit of fleeing a country at the worst times, as many countries have rediscovered; Mexico in 1994, Argentina in 1995, and Korea and Thailand in 1997 are perhaps the most important recent examples.

Clearly, there are risks associated with allowing capital to continue to flow into a country for long periods of time.<sup>42</sup> The alternative is to stop the capital from coming in the first place.

There are two conceptually different methods of stemming capital inflows. The first is simply to restrict capital flows through administrative controls. Providing insulation from international capital flows through fiat has long been a standard tactic for developing countries (as a glance through the IMF's *Exchange Arrangements and Exchange Restrictions* indicates). Chile is often cited as a country that avoided the tequila effect of 1995 because of its controls on capital inflows. Indeed, many OECD countries imposed capital controls

41. See chap. 4 of Ito and Folkerts-Landau (1996) for references on this issue.

42. Deficits have comparable problems but are usually even less sustainable, since international reserves are smaller than domestic credit for most countries.

throughout the long post–World War II boom and have only removed them recently; France and Italy only reduced barriers in 1990.

But legal restrictions on capital flows come at a cost. While international financial activity may be “naturally” limited because of the enforcement and information reasons discussed above, it may still be enormously beneficial for capital-poor countries or countries that need competitive international markets to discipline domestic markets. Restricting access to foreign pressures over long periods can reduce domestic growth as a result. Moreover, countries are understandably reluctant to compromise their long-term access to international capital markets for short-term reasons.

Instead of permanently disrupting the linkage between the domestic and foreign financial systems, a more reasonable approach to countering a capital inflow may be to eliminate the underlying causes of the inflow. Both monetary and fiscal policy have important effects on the balance of payments and can be used to reduce or eliminate capital inflows. By lowering interest rates through the application of loose monetary policy, the monetary authorities can induce lower capital inflows directly. Alternatively, tighter fiscal policy can lower domestic absorption, thereby improving the current account and reducing net capital inflows; a fixed exchange rate can be devalued toward the same end.

While domestic policy instruments can be used to eliminate the underlying capital flows, the point remains: the independence of national macroeconomic policy is compromised as a result of international capital flows. In the case of unwanted capital inflows, either domestic monetary policy must be loosened or fiscal policy must be tightened. Neither policy may be desirable from a purely domestic perspective.

This argument is usually expressed in a more concise form that focuses on the purely monetary effects of capital inflows. Mundell’s celebrated “Incompatible Trinity” states that international capital mobility, fixed exchange rates, and domestic monetary independence are mutually incompatible. A country may choose to stabilize its exchange rate for a variety of different reasons (e.g., to provide a nominal anchor for monetary policy or to encourage international trade by lowering exchange rate volatility). But once the country has decided to smooth its exchange rate, allowing unrestricted international capital flows comes at the risk of monetary instability. More precisely, the country relinquishes its ability to conduct monetary policy for purely domestic reasons because maintaining the exchange rate becomes the objective of monetary policy. As a result, the country bears higher risks of business cycle fluctuations. And if the country chooses instead to focus monetary policy on purely domestic objectives, this comes at the risk of unstable exchange rates and the instability that is associated with exchange rate variability.

In sum, reducing barriers to international capital flows may provide a number of microeconomic benefits, as discussed above. But the increased exposure to foreign capital means that the ability of the authorities to conduct independent policy oriented toward domestic objectives becomes more limited. Open-

ness and external stability (of the exchange rate and balance of payments) come at the cost of the increased risk of domestic fluctuations.

### Summary

Both sovereign risk and the monetary effects of net capital flows are macroeconomic issues that constitute extra risks from international financial activity. Sovereign risk is an issue of concern for both lending and borrowing countries. Net creditors face the risk of expropriation and default, but borrowers are affected because of the resulting higher interest rates and loan limits. Similarly, the monetary regimes of both lending and borrowing countries are fundamentally affected by openness to international capital flows; unwanted capital flows create macroeconomic instability.

### 7.1.5 Conclusions

In this paper we have provided a framework to analyze the risks to borrowers and lenders that are inherent in international financial activity. Microeconomic risks in all financial activity stem from two basic problems. Imperfect information compromises the ability of lenders to monitor the behavior of borrowers; the inability of borrowers and lenders to sign enforceable all-encompassing contracts at low cost also limits financial activity. Both of these problems are serious even in a purely domestic setting. And both are likely to be more problematic when financial activity takes place across international boundaries. At first glance, the low levels of international financial activity would seem to be unsurprising, except for countries with very different levels of capital, systematically different risks, or inefficient domestic financial sectors (the very countries that typically restrict international capital flows). This is especially true when we take into account two macroeconomic risks that have no analogue in a purely domestic setting: sovereign risk and monetary spillovers.

Still, many fundamental sources of risks are slowly being overcome. Information flows more easily than ever before, and the advantages that domestic residents have over foreigners in both enforcement and information are being eroded. Economic liberalization, increased dependence on foreign trade, and reduction in the state sectors of many countries reduce the risk of nations' defaulting on their debt or nations' using their sovereignty to thwart collection of debts from domestic firms. As these trends continue, we should see greater amounts of international capital flow and lower exposure to risk.

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## 2. Peter M. Garber

### Derivatives in International Capital Flows

The explosive growth of derivative products in the past fifteen years has paralleled the growth of cross-border gross capital flows. The use of derivative products has been a major factor in the growth of cross-border capital movements for several reasons. First, by allowing the separation of various risks associated with cross-border investment, it makes such investment more attractive. Portfolio diversification becomes more likely, with a consequent increase in gross international flows. Moreover, impediments to movement of capital in search of higher real yields weaken, with a consequent increase in net flows. Various dimensions of risk can be moved across borders to markets that find them less unattractive. Indeed, such potential gains in the efficiency of the international allocation of capital has redefined a major, profitable segment of the international wholesale banking market.

The problems associated with the rise of derivatives stem partly from the

same source as the benefits: the increased ability to separate and market risks means that some counterparties can assume riskier positions more readily than in the past. Coupled with the existence of weak financial systems and the inherent opaqueness of derivative positions due to obsolete accounting systems, slow reporting, and unprepared supervisors, derivatives can be used to leverage financial safety nets in efforts to double up lost financial bets. Often, such activity must move offshore to evade detection and naturally generates a gross international capital flow. Moreover, derivatives can be used readily to evade onshore prudential regulation and capital or exchange control, thereby generating yet more measured capital flows.

Interpretations of the causes and dynamics of the sudden capital flow reversals associated with balance-of-payments crises generally are based on on-balance-sheet information. In the presence of derivatives, however, such data can generate false inferences about the sources of a crisis and lead to misinformed policy prescriptions. They confound the sources of the crisis: whether it stems from foreign speculators, panicked green-screen traders, or domestic insiders armed with knowledge about weak fundamentals. In addition, in the presence of large volumes of derivatives, claims that crises are generated by such inappropriate policies as an excessively short maturity of the public debt can be mirages of on-balance-sheet accounting.

Even on-balance-sheet data for measuring the quality of international capital flows—the capital accounts of the balance-of-payments data—are obscured by derivatives used to enhance risk or evade controls or even for benign purposes. Subaccount data, such as portfolio investment, equity investment, foreign direct investment, or long- or short-maturity fixed interest rate lending, are illusory in the presence of substantial volumes of derivative products.

The remainder of this essay will provide general descriptions of some of the basic derivative products, along with recent data on the extent of the market in derivatives.<sup>1</sup> After a discussion of the positive effects of derivatives—the ability to refine the management of risk—the paper will examine the negative aspects of these products: their role in enhancing risk taking, in evading prudential regulations, taxes, and controls, in channeling the dynamics of currency and financial crises, and in obscuring the meaning of capital accounts data from the standard balance-of-payments accounts.

### 7.2.1 Some Basic Derivative Products

While the list of exotic derivative products expands almost daily, most derivatives outstanding are relatively simple, consisting mainly of *forward* contracts, *swaps*, and basic *options*, whose notional values are indicative of the magnitude of the market risks that are being acquired or hedged. *Structured notes*, however, are implicitly highly leveraged products whose notional values

1. The paper is an adaptation and expansion of ideas developed in Garber (1996), Garber and Lall (1996), and Folkerts-Landau and Garber (1997).

generally underestimate significantly the magnitude of the risks taken. Here I will concentrate only on a few types of swaps and structured notes.

A *generic swap of yields* is an exchange of the percentage return on one type of asset during a given period for the percentage return on another asset, multiplied by a predefined notional value to convert percentages to cash equivalents. Both returns are observable in security or banking markets. The swap may involve a periodic exchange of yields for a fixed period of time and settlement only of the net amount due. Specifically, for a given currency, an *interest rate swap* is an exchange of a fixed interest return for a floating return or perhaps one floating interest rate for another. An *equity swap* or *total return swap* generally is a periodic exchange of the return on a given share or equity index, including dividends and capital gains, for some interest yield, multiplied by a notional value in a given currency.

Interest and equity swaps do not involve initial and final payments of principal or notional value, although the counterparty with the greater credit risk may have to deliver some collateral. Currency and foreign exchange swaps do require initial and final delivery of principal. A *foreign exchange swap*, generally a very short term deal, is a combination of a spot sale of currency and a forward purchase—it packages in a single deal both foreign exchange market legs of the familiar interest rate parity arbitrage operation. Foreign exchange swaps coupled with spot exchange sales are the standard wholesale market technique for establishing forward currency positions. A *currency swap* similarly requires an initial and final exchange of principal amounts of the two currencies at predetermined forward exchange rates, but it is of longer maturity and involves periodic exchanges of interest on the principal amounts in the two currencies. A currency swap can be interpreted as a bundle of forward exchange contracts with sequentially lengthening maturities.

A structured note requires the delivery of a given amount of principal by the buyer to the seller, as in a standard bond purchase. The payoff of either interest or principal is set as a function of some underlying market value, such as an exchange rate or interest rate. Depending on the nature of the formula, the payoff may deliver multiples of the initial principal; or on the downside, the principal may be wiped out.

## 7.2.2 Data on the Extent of Derivative Markets

The 1995 Bank for International Settlements (BIS) survey of market participants in the major and many minor financial centers indicated that the notional value of over-the-counter (OTC) derivative products outstanding was \$47.5 trillion in March 1995, and of this about 55 percent were cross-border transactions.<sup>2</sup> Most of this amount consisted of simple interest rate products such as

2. "The global nature of the markets is underlined by the large amount of business contracts with counter parties located abroad" (BIS 1995, 24).

In a survey of its members, the International Swap Dealers Association found that outstanding swaps had increased by 37 percent between 1995 and 1996, although this was not as comprehen-

swaps, and most cross-border transactions occurred between industrial countries.<sup>3</sup> For other derivative products, there are, nevertheless, large notional values outstanding in absolute terms—equity-based products and structured notes and options that may be quite complex—and these are also used to an ever expanding extent in key emerging market countries.

Of the \$47.5 trillion in OTC notional values, 61 percent was in interest rate instruments, and 37 percent was in foreign exchange instruments, including outright forwards and swaps. Outstanding equity contracts amounted to 1.25 percent and commodity-related instruments were 0.75 percent of the overall notional value, or about \$590 billion and \$350 billion, respectively. Exchange-traded contracts outstanding amounted to \$8 trillion, almost all of which were interest rate contracts. Gross market values or replacement costs were \$2.2 trillion for OTC contracts, about 4.6 percent of the notional value.<sup>4</sup>

Of the interest rate products, 50 percent were cross-border; while 56 percent of foreign exchange products were cross-border, for an overall total of about \$26 trillion (BIS 1995, 23, table D3). For equity products, cross-border position data are not reported by the BIS. For comparison, the total stock of domestic and international securities in the OECD countries was \$26.3 trillion, and international banking assets excluding security holdings were \$8.3 trillion in March 1995.<sup>5</sup>

Thus, if applied one to one to outstanding securities, the stock of both OTC and exchange-traded derivatives was sufficient to have repackaged the risk characteristics of all domestic and international securities and all international banking assets. Of the outstanding volume of OTC products, however, about 57 percent of the local and cross-border deals were between dealers to balance positions.

### 7.2.3 Why Derivatives Can Increase Cross-Border Movement of Capital

It is worthwhile at this point to consider a brief set of examples of derivative products. These examples will be used throughout the remainder of the paper to show how derivatives might aid in the diversification of portfolios, reduce or enhance risk, evade prudential regulations, and avoid capital controls and

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sive a survey as that of the BIS. Exchange-based contracts outstanding were stagnant over the year, however. See BIS (1997, 130, 136).

3. Thus the problem of inferring market risk from balance-of-payments data applies especially with regard to the positions of industrial countries. Academic investigations of the lack of cross-border portfolio diversification based on capital account data are seriously compromised by this gap in these data.

4. Most derivative products are priced on initiation of the contract so that they have zero market value. As underlying market prices move through the life of a contract, the contract—which is a bet on the movement of the underlying prices—acquires positive absolute value. This value is called “replacement cost.”

5. Notional amounts do not reflect payment obligations. They do reflect price exposure in the underlying markets, and they are useful for comparison with the underlying amounts outstanding. See (BIS 1995, 24).

taxes. In these activities, they can create gross international capital flows that otherwise might not have materialized, but they also can confound the nature of the cross-border flows that do occur. Some of the derivative types in the following examples were important in the Mexican exchange rate crisis of 1994–95, so they will be developed in the Mexican context, which is used as a backdrop for many of the succeeding conclusions; but they are generic products and are used worldwide for the same reasons they were used in Mexico.

### Currency Swap

The initial example is a plain vanilla currency swap in its most common context. Suppose that IBM sells deutsche mark bonds in Germany to shave some basis points from its finance costs—German fund managers find IBM securities desirable for diversification purposes but insist on deutsche mark settlement. IBM wants dollar liabilities, however, because of the nature of its earnings stream. It enters a currency swap with a U.S. bank, equivalent to a stack of forward exchange contracts in which IBM pays dollars at predetermined exchange rates and receives the marks needed to cover its bond obligations. In its net position, IBM is then a dollar debtor, and the bank has acquired the currency risk. Similarly, Daimler-Benz also can save basis points by placing its bonds with a U.S. pension fund, which also seeks diversification of credit risk, but it must denominate the bonds in dollars. Another, opposite currency swap is born, perhaps with the original U.S. bank as the natural, ultimate counterparty. The U.S. bank makes the market and takes a spread but has no net currency position.<sup>6</sup>

There is no *net* international movement of capital, but the two bond issues appear on balance sheet as *gross* capital flows to be captured by the periodic snapshots of the balance-of-payments data. In the absence of the swaps, neither borrower may have found it beneficial to go to an offshore market and may have confined its borrowing to domestic lenders, leaving no tracks in the data on gross international capital movements. As off-balance-sheet items, the swaps are not reported and are not captured in balance-of-payments data, except to the extent that collateral is demanded by the market-making bank from one or both final counterparties.

### Single Currency Interest Rate Swaps

It is natural that gross capital flows should arise from currency swaps, because a cross-border flow is at the heart of the swap deal. With interest rate swaps in a single currency, which account about 60 percent of the outstanding OTC notional value, the natural international aspect disappears. Nevertheless, such swaps are frequently associated with capital flows. Suppose that a highly rated U.S. company borrows fixed interest dollars in London and enters a swap

6. See Feldstein (1994, 13–14) for further analysis of net vs. gross movement of capital in the presence of derivatives.

as a floating rate payer with a bank—it will pay three-month dollar LIBOR multiplied by the notional value of the swap at the same maturity as its bond. On net, the U.S. company has converted its required service payments into floating rates, which it prefers. The bank's balancing customer might be a lesser rated Italian company that sells floating rate dollar-denominated securities in London but wants to pay fixed interest. In the absence of the swap, the U.S. company might have preferred to borrow at floating rates directly in the United States, but it is encouraged to borrow in London because the swap allows it to shave basis points from the deal, and similarly for the Italian company. The funds for the principal of the two loans have to come from somewhere. Whoever would have bought the U.S. company's potential U.S. bond issue—say a U.S. resident—will now buy its more attractive Eurobond issue, and similarly for the Italian company. Again, there are no net cross-border flows but positive gross flows. Before the advent of interest rate swaps, this gain from trade between the two companies would not have been possible, and the deals would have been financed directly from national sources.

#### Tesobono Swaps and Repos

The interest rate swaps described above involved exchanging fixed for floating rate yields in a single currency or fixed rate for fixed rate yields in two different currencies for relatively long maturities. Similar deals are made in large volumes for shorter maturities. Here, the *Tesobono swap* will serve as a useful example of such deals.

Tesobono swaps were offshore derivative operations used by Mexican banks as a means of leveraging Tesobono holdings, the notorious treasury bills of the Mexican government indexed to the peso-dollar exchange rate. In a Tesobono swap, a Mexican bank received the yield earned on Tesobonos and delivered dollar LIBOR plus some additional basis points, multiplied by a notional amount of dollars.

The leverage involved in Tesobono swaps can be most readily examined by analyzing first the nearly equivalent Tesobono repurchase agreement. As an example, consider a New York investment firm that is willing to lend dollars for one year against Tesobono collateral through a repurchase agreement. The firm engages in a repurchase agreement with a Mexican bank to buy Tesobonos at some agreed price and to resell them in a year at the original price plus a dollar interest rate.<sup>7</sup> In the example in table 7.5, a Mexican bank sells \$1 billion of Tesobonos to a New York firm for \$800 million with an agreement to repurchase the Tesobonos in one year for the original price plus the LIBOR plus 1 percent interest. The yield on Tesobonos is 8 percent while dollar LIBOR is 5 percent. Effectively, the Mexican bank has financed a \$1 billion Tesobono position by borrowing \$800 million, although official data on Tesobono holdings will indicate that a foreign address holds the Tesobonos. The gain to the

7. In the swap form of the deal, of course, only net amounts were due in each settlement period.

**Table 7.5** Tesobono Repurchase Agreement

- 
1. Tesobono yield = 8%  
LIBOR yield = 5%  
Maturity = 1 year
  2. Mexican bank sells \$1 billion of Tesobonos to New York firm for \$800 million with agreement to repurchase in one year for  $\$800 \text{ million} \times (1 + \text{LIBOR} + 1\%)$
  3. New York firm funds 80% of Mexican bank's position—has \$200 million of margin (20%)
  4. New York firm is a foreign address holding \$1 billion of Tesobonos
  5. Mexican bank gets Tesobono return at 8% on \$1 billion, finances 80% at LIBOR + 1%: 2% spread
  6. New York firm borrows \$800 million at LIBOR, lends at LIBOR + 1%
- 

**Table 7.6** Tesobono Swap

- 
1. New York firm delivers Tesobono yield for LIBOR + 1% with Mexican bank on \$1 billion notional principal
  2. New York firm requires deposit of 20% margin—\$200 million
  3. To hedge, New York firm buys \$1 billion of Tesobonos, financed by \$200 million margin from Mexican bank, \$800 million borrowed at LIBOR
  4. Foreign address holds Tesobonos
  5. Mexican bank puts up \$200 million of own funds to get \$1 billion of Tesobono yield
- 

Mexican bank is that it pays LIBOR plus 100 to finance Tesobonos that may pay the equivalent of LIBOR plus 300. The gain to the U.S. lender is that it gets to place dollar funds at LIBOR plus 100 against good collateral while it borrows at LIBOR.

A *Tesobono swap* places both parties in the same risk position as a repurchase agreement. Table 7.6 indicates the positions taken if the financing of the Mexican bank's Tesobono position takes the form of a Tesobono swap. Suppose the New York firm swaps Tesobono yield in return for LIBOR plus 100 basis points against a \$1 billion notional principal. It requires \$200 million as collateral from its Mexican counterparty, that is, a margin deposit of 20 percent to guarantee compliance with the contract. The payoffs to the two counterparties are identical to those under the repurchase agreement. To hedge, the New York firm will purchase \$1 billion in Tesobonos directly from the market, paid from the \$200 million margin and \$800 million borrowed at LIBOR. As before, the Tesobonos will be held by a foreign address, although Mexican domestic residents will bear the Tesobono risk.

In either form, these operations serve to channel a net flow of capital of \$800 million into Mexico, which ultimately finances the government. Gross flow data picked up in the normal balance-of-payments operation will measure an inflow of \$1 billion worth of Tesobono purchases and an outflow in the form of bank deposits for the collateral of \$200 million. The swap, however, disguises the nature of the flow. Superficially, it appears that foreign lenders are buying Mexican government debt in the form of Tesobonos—that is, they are satisfied to hold the indexed T-bills at the maturities offered by the managers

**Table 7.7** Equity Swap

- 
1. New York firm delivers total return on Telmex for LIBOR + 3% with Mexican bank on \$1 billion notional principal
  2. New York firm requires deposit of 20% margin—\$200 million
  3. To hedge, New York firm buys \$1 billion of Telmex American Depository Receipts, financed by \$200 million collateral from Mexican bank, \$800 million borrowed at LIBOR
  4. Foreign address holds Mexican shares
  5. Mexican bank puts up \$200 million of own funds to get \$1 billion of stock market risk
- 

of the Mexican public debt. In fact, they are making short-term dollar loans, while Mexican residents are holding the Tesobono risk. On the national balance sheet—consolidating the government and domestic banking sectors—Mexico is a short-term borrower of dollars.

### Equity Swaps

Table 7.7 presents an example to show that an equity swap establishes a leveraged position in shares, with funding coming from an offshore source. Again, a Mexico-based example will be used with an eye on later exposition, but such cross-border deals are commonplace.

Suppose that a Mexican bank agrees to swap the total return over one year on Telmex for dollar LIBOR plus 300 basis points on a notional amount of \$1 billion. Its offshore counterparty, a New York securities house, requires \$200 million in collateral. To hedge its short equity position, the New York firm then directly buys \$1 billion worth of Telmex shares, thereby appearing as a foreign investor in Mexican shares. The New York firm is taking a long position in short-term dollar loans while the Mexican bank has a long position in Telmex shares and a short position in short-term dollar loans. The Mexican bank has acquired \$1 billion of Telmex risk by putting up \$200 million of collateral in New York.

Again, balance-of-payments accounts will report a gross inflow of \$1 billion worth of equity purchases for portfolio investment or perhaps foreign direct investment and an outflow of \$200 million in bank deposits. The Mexican bank—and therefore the national balance sheet—holds the equity risk, while the foreign address is only a short-term dollar lender.

### Structured Notes

Structured notes exist in many forms, but the example studied here will determine the payoff on what might be described as a “bullish obligation on the peso,” as presented in table 7.8.<sup>8</sup> For example, a Mexican bank or its foreign subsidiary might buy a note with a twenty-nine-day maturity from a New York investment house for \$10 million. The coupon on the note and the principal on the note are payable in dollars. Suppose that the coupon offered on the note is

8. The description of this note was taken from an indicative term sheet issued by Donaldson, Lufkin and Jenrette on 22 March 1995.



**Table 7.8** Bullish Obligation on the Peso

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1. $i_{\text{cetes}} = .85$ annual
2. $i_5 = .05$ annual
3. Maturity of contract = 29 days
4. Overall payoff of the note = Coupon + Principal
$= 1.95 * 7.0/P_m * 29/360 + 1 + 3 [(7.0 - P_m)/P_m]$
5. Some arithmetic to determine implied dollar and new peso (Npeso) positions:
Payoff = $(-2 + 3.157 * 7.0/P_m) \times \$10$ million
$= -\$20$ million + $\$31.57$ million $* 7.0/P_m$
$= -\$20$ million + Npesos 221 million/ $P_m$
Present values:
Current dollar position = $-\$19.92$ million
Current Npeso = 209.95 million = $\$29.99$ million

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195 percent annually multiplied by the ratio of the current spot value of the peso to the peso-dollar exchange rate at maturity. Interest rates on peso paper such as Cetes—peso-denominated treasury bills—are 85 percent per annum and 5 percent on dollar paper. The principal repayment also depends negatively on the peso value of the dollar at maturity—suppose it will be  $[1 + 3 \times (7.0 - P_m)/P_m] \times \$10$  million, where 7.0 is the initial peso value of the dollar and  $P_m$  is the value at maturity. In an extreme case, if the peso has depreciated by 50 percent at maturity, from say 7.00 to 14.0 pesos per dollar, the principal repayment will be  $-\$5$  million. The overall payoff is then  $-\$3.25$  million.<sup>9</sup> Conversely, if the peso appreciates significantly, the payoff can be a multiple of the initial investment. Table 7.8 shows that this is the payoff structure of a position that is currently short about \$19.92 million at a market dollar interest rate of 5 percent per year and long 209.95 million pesos at a market peso interest rate of 85 percent per year. Effectively, the initial \$10 million investment has been leveraged threefold and invested in peso paper.

Overall, through the payoff formula, the New York investment house would have a position equivalent to being short 209.95 million worth of peso paper and long \$19.92 million worth of dollar loans. In addition, it has the initial \$10 million from the sale of the note. To hedge, it may wish to buy the peso by investing in one-month Cetes while simultaneously selling the dollars in the position. It would then appear in the on-balance-sheet accounts as a foreign buyer of a peso-denominated asset rather than as a dollar-denominated lender, which is its true position.<sup>10</sup>

If the seller of the note hedges the position, the balance-of-payments accounts will report a net inflow of about \$20 million. This will result from a gross inflow of about \$30 million in the form of portfolio purchases of short-

9. As a safety feature for the buyer, such structured notes cap the potential losses. E.g., in the actual “bullish obligation,” in no case would the principal redemption plus coupon payment be less than zero. This adds a put option feature to the note.

10. As an additional feature, such notes contain clauses that state that the notes will pay zero if there is a “default event” on Cetes or an “exchange control event.” This is a sort of poison pill that automatically wipes out part of domestic bank capital in a country that imposes such policies.

term, peso-denominated government paper and an outflow of \$10 million in the form of a Mexican bank's purchase of a short-maturity, dollar-denominated note.

### **7.2.4 Circumventing Prudential Regulations and Capital Controls**

In addition to their normal uses in portfolio diversification or risk reduction, derivatives can be used to increase risk—one side of the deal may be speculating. In weakly regulated, undercapitalized financial systems, derivatives provide a perfect opportunity for financial intermediaries to acquire risky positions in attempts to recover capital. This section will show how derivatives such as those in the examples developed earlier can be used to escape prudential regulation and capital controls.

#### **Evading Prudential Regulation**

Prudential regulations of varying stringency are well accepted across different financial systems, but they are especially important in the presence of large capital inflows. Such inflows, in particular, increase the potential to have systemic failures in the financial sector because of the rapid expansion of bank balance sheets into unfamiliar business. If capital suddenly flows into a country in quantity, there will be a general expansion of the financial system and investment projects; and it is not clear that a large fraction of the investments will be placed in “good” projects. There is a belief among regulators and academics that inflows are often the results of various investment fads—ultimately, investor disappointment over the payoffs from these investments will lead to an attempt to withdraw funds. Therefore, regulations are imposed—such as reserve requirements, limits on lending to individuals, firms, or sectors, liquidity requirements against domestic or foreign exchange liabilities, net foreign currency exposure limits, and capital requirements—which aim at channeling inflows away from banks and risky projects. Similarly, a ban on holding securities on margin or on short sales will mean that equity holders will not be forced to join the general scramble for cash in a liquidity crisis and thereby reduce the potential magnitude of the demand for cash. Nevertheless, bans on margin buying tend to push such activity offshore, through OTC derivative markets.

Banks can readily avoid regulations either in a straightforward manner or by going offshore or engaging in off-balance-sheet activities, which violate the intent, if not the letter, of regulations. We will examine how structured notes and equity swaps can be used to avoid such regulation.

#### *Structured Notes*

As shown earlier, structured notes are investment vehicles with coupon payments and principal repayments driven by formulas that can leverage the initial capital invested. Nevertheless, in value accounting systems they can be booked as normal investments and in the currency denominated in the prospectus.

More than simply magnifying the usual market risks associated with investment positions, structured notes provide an easy method for circumventing prudential regulations on currency positions or interest rate mismatches.

In the context of section 7.2.3's example, booked as claims of Mexican institutions with dollar principal and dollar payoffs, these notes in fact were currency bets that created a short dollar and long peso currency position to take advantage of positive interest rate spreads between peso and dollar money markets.<sup>11</sup> The notes were reported by Mexican banks as dollar assets, allowing them to offset short dollar positions in meeting regulatory limits on net foreign currency positions. In addition, some banks could count them to satisfy their liquidity coefficient required for foreign-currency-denominated liabilities because their short maturity allowed them to be classified as liquid deposits. In the event of a depreciation of the currency, banks might have a much larger net short dollar position and greater losses than regulators had realized.

Held in this way, the structured note of the example is a financial engineering device to circumvent prudential regulation. Only the principal was booked, in accordance with value accounting principles. The structured note payoff formula component was not booked—it is an off-balance-sheet item. That is the accounting trick—one can alter the nature of the booking through a complicated payoff formula. The use of the trick, however, requires an outflow of capital in the form of principal. Thus a net inflow of \$20 million takes the form of a gross outflow of \$10 million and a gross inflow of \$30 million.

### *Equity Swaps*

As a means of taking a position in stocks, the market in equity swaps can be used to avoid financial market regulations against such positions. Such regulations may ban buying securities on margin or short selling or limit the share positions of foreign addresses.<sup>12</sup> The benefits to market participants of the existence of this market are obvious. Speculators can leverage and gain larger positions, and hedgers of long positions held either directly or implicitly in the form of options can short stock to cover their positions. Again, net short-term dollar foreign borrowing for domestic stock purchases takes the form of a gross outflow in the form of dollar-denominated margin and a larger gross inflow in the form of a stock purchase by a foreign address.

### Avoiding Capital Import Taxes or Controls

Taxes or outright bans on the acquisition by foreign addresses of domestic securities have emerged in recent years as a means of stemming capital inflows.

11. In Malaysia, these instruments, known as "principal adjusted coupon notes," serve the same purpose of providing leverage in domestic currency positions to foreigners through foreign exchange financing. Regulation precluded foreign addresses from directly holding short-term ringgit claims onshore.

12. Offshore equity swap markets also exist for Malaysia, Korea, and Thailand, among others, also in order to avoid curbs on short selling and leveraging.

They sometimes have been imposed differentially by maturity of asset and by type of asset. Often, such taxes have been successful in that they have placed a wedge between domestic and foreign yields on similar assets. They can be breached by the usual invoicing subterfuges, but market participants have also used financial engineering to circumvent the taxes. Specifically, suppose that an enforceable tax is placed uniformly on all forms of gross inflows. Then any positive net inflow will incur the tax, but gross transactions will move offshore. As an example, instead of acquiring an equity position directly, a foreign investor will buy an offshore equity swap from a domestic resident who can hedge without a tax. If the domestic resident has a lower credit rating, an export of capital in the form of margin will be recorded. There will be no taxable inflow, but foreigners can take risk positions in domestic assets.<sup>13</sup>

If the tax is differential across types of assets acquired from abroad, the net inflow will tend to take the form that incurs the lowest tax. Similarly, if differential controls are imposed allowing equity investment but limiting short-term fixed interest inflows, the flows will enter through the least restrictive door. The risk and maturity characteristics of the inflow can then be resculpted through offshore derivatives to a more desirable form. For instance, if equity investment is given better treatment than short-term fixed interest securities or bank deposits, the inflow will take the form of a stock acquisition together with an equity swap that converts it on net into a floating interest loan of foreign currency. Even the maturity of the loan can be adjusted with an attachment by the lender of a stringent margining provision that permits the offshore creditor to realize cash on call.

### **7.2.5 The Role of Derivatives in Crisis-Driven Capital Outflows**

Where such markets exist, forward contracts are the speculator's instrument of choice in implementing an attack on a currency, the beginning of a sudden outflow of capital. Positions in forward contracts can arise suddenly or be built up gradually in the expectation of an impending devaluation. Such derivatives serve merely to effect a crisis that is emerging from other causes. Other derivative products, already outstanding in large volumes, may reflect an environment in which such speculation may be successful and may even determine the dynamics of the currency and financial crisis that ensues.

This section will show how forward contracts transmit an impending attack on a central bank's reserves through foreign exchange swap and spot exchange markets.<sup>14</sup> Next, using the examples developed earlier from the Mexican case,

13. In the case of Chilean equity, market sources report that offshore equity swaps are used regularly to permit trading in Chilean equity. They also report serious, though as yet unsuccessful, financial engineering research efforts to crack directly the Chilean tax on capital imports in the form of a uncompensated deposit requirement.

14. This section has been adapted from the exposition on the mechanics of speculative attacks from Goldstein et al. (1993) and notes written for Folkerts-Landau and Garber (1997).

it will show how the existence of these products operated to determine the dynamics of exchange markets leading into the currency crisis of December 1994, to determine the magnitude of the final attack, and to drive the foreign exchange market turbulence in the months after the attack.

### The Mechanics of Speculative Attack

This section covers the mechanics of exchange market operations in speculative attacks. It shows how transactions in forward exchange work their way through the banking system and how they are financed. It discusses in particular the effect of reducing credit to speculators, either through interest rate increases or, more directly, through controls.

Speculators generally attack a weak currency by selling the currency through forward contracts to a bank at relatively long maturities, for example, thirty days.<sup>15</sup> Whether a customer speculates through a short sale or hedges a long position, the international banking system handles a forward sale of a currency in the same way. As standard practice to balance the long position in the weak currency that this transaction initiates, the counterparty bank will immediately sell the weak currency spot for the conventional two-day settlement. Although its currency position is then balanced, the bank still has a maturity mismatch in both currencies: it can borrow the weak currency overnight to cover settlement of the spot sale, but it will receive the currency in thirty days through the forward contract. It faces the opposite maturity mismatch with its strong currency position. To close this maturity mismatch, a bank typically will transact a foreign exchange swap. These are customary wholesale operations executed by banks writing forward contracts to customers, in both normal periods and speculative episodes.

Table 7.9 presents a concrete example of such a forward transaction. In this example, the weak currency is the baht and the strong currency is the dollar. Suppose that the forward and spot exchange rates between the dollar and the baht are 25 baht per U.S. dollar. In the first step, a customer sells 2,500 baht forward for \$100 to a bank. This is an off-balance-sheet item for the bank, but it has payment implications like any on-balance-sheet transaction. The payment and receipt implications for the bank are displayed in the first panel. The bank will receive 2,500 baht and pay \$100 in one month. These are the same movements of funds that the bank would face if it were long a baht Bank of Thailand bill and short a U.S. Treasury bill. To eliminate the currency mismatch, the bank immediately sells 2,500 baht for dollar spot exchange, the payment implications of which are combined with those of the forward con-

15. Forward sales may also be launched by hedging programs implemented by fund managers, nonfinancial corporations, and market makers. Speculators may also attack a currency by buying put options on the currency. From the perspective of the counterparty bank, this creates a long forward position in the weak currency in an amount indicated by the option pricing formula used by the bank. The bank's hedging program will respond in the same way as if the bank had entered directly into a forward contract with its counterparty. See Garber and Spencer (1995) on the effects of such hedging in a crisis.

**Table 7.9 Receipts and Payments to Counterparty Bank Arising from Forward Contract Operations**

Receipt	Payment
<i>Step 1: Forward Contract = Currency Mismatch</i>	
2,500 Baht in one month	\$100 in one month
<i>Step 2: Forward Contract + Spot Sale = Maturity Mismatch</i>	
2,500 Baht in one month (forward)	2,500 Baht in two days (spot)
\$100 in two days (spot)	\$100 in one month (forward)
<i>Step 3: Forward + Spot + Swap = Balanced Position</i>	
2,500 Baht in one month (forward)	2,500 Baht in one month (swap)
2,500 Baht in two days (swap)	2,500 Baht in two days (spot)
\$100 in one month (swap)	\$100 in one month (forward)
\$100 in two days (spot)	\$100 in two days (swap)

tract in the second step. The currency positions are now balanced, but there remains a maturity mismatch in each currency—one-month baht are funded with rollover baht and rollover dollars are funded with one-month dollars. To eliminate the maturity mismatch, the bank immediately undertakes a one-month foreign exchange swap, exchanging \$100 for 2,500 baht spot and 2,500 baht for \$100 thirty days forward. The complete payment implications for the bank are displayed in the third step: the bank has eliminated market exchange and interest rate risk through these transactions.

This example indicates that a baht-dollar forward contract is equivalent to a foreign exchange swap combined with a spot exchange transaction. Also, on its origination, a forward sale of baht by the customer immediately generates a spot sale of baht by the bank.

Who is the ultimate counterparty in these transactions? In time of crisis, there are few spot market buyers of the weak currency, so a central bank defending an exchange rate level must appear as the counterparty through its exchange market intervention.

A customer in the forward market may be a central bank, which can intervene in the foreign exchange market to defend parity by buying its currency forward rather than spot. If the central bank's forward purchase of its currency matches a forward sale of some other customer of the banking system, all the swap and spot transactions of the banking system will balance; specifically, spot exchange sales will be matched with purchases at the parity exchange rate. Thus the central bank's forward intervention will absorb the spot sales of its currency without the central bank's having to intervene directly in the spot market. By entering a forward contract, the central bank implicitly supplies domestic currency credit directly to the short seller of its currency. The short seller in this example is obligated to deliver the weak currency to the central bank on the value date of the forward contract, effectively a loan from the central bank.

In a currency crisis, with the potential for a one-sided bet, few private parties

would be willing net suppliers of weak currency credit. Nevertheless, to fuel a speculative attack, the world banking system must in aggregate provide credit in the weak currency to the short sellers. This is evident in the first step in table 7.9, where the bank's baht receipts from the forward contract embody a one-month baht loan to the short seller. If the central bank does not supply the credit directly through forward intervention, the credit must come either through its money market operations or its standing facilities. In any crisis, the baht provided by the banking system are a pass-through of credit from the Bank of Thailand, which must be the ultimate counterparty in both legs of the position-balancing transactions of the banking system. The bank in the example must find a counterparty bank to engage in the swap. By entering into a one-month baht foreign exchange swap, the counterparty bank effectively lends baht spot to be repaid in one month. When the baht are sold on the spot market, they are bought by the Bank of Thailand—and the other regional central banks that support it—in the campaign to defend the exchange rate. In lending spot baht through the swap, the counterparty bank acquires the baht needed for spot delivery either by discounting paper through the standing facilities of the Bank of Thailand or through outright sale or sale with repurchase through the Bank of Thailand's market operations.

#### Derivatives and the Dynamics of Capital Flow Reversals

Even in countries where currency forward contracts did not play a role in a sudden reversal in capital flows, other derivative products may be present in sufficient quantities to affect the dynamics of a crisis. The Mexican peso crisis of 1994 is such a case. Speculators did not use the forward market suddenly to short sell the peso. Rather, outstanding products of the sort outlined earlier drove the near-in movements of capital going into and coming out of the devaluation of the peso.

The derivative positions that drove the crisis were established by a weak banking system hungry for current income. The Mexican groups that had purchased the banks upon privatization in 1991–92 had financed the aggregate \$12 billion price through substantial amounts of borrowing. Interest due had to be paid through current bank income, and this led the banks into taking increased credit risk through on-balance-sheet expansions and increased market risk through off-balance-sheet growth.

#### *Tesobono Swaps*

Industry sources in Mexico report that there was a stock of about \$16 billion of Tesobono swaps at the time of the devaluation.<sup>16</sup> Of the \$29 billion of Tesobonos outstanding on 19 December 1994, about \$16.1 billion were held by

16. Such numbers are guesswork because no one aggregates such data. Nevertheless, similar estimates were given to me by market managers at the top two banks in Mexico, which did a large fraction of the business.

foreign addresses. Thus sufficient Tesobono swaps existed to repackage the entire foreign holding of Tesobono risk: foreigners held Tesobonos primarily to hedge Tesobono swaps and Mexican banks held the Tesobono risk.

When the crisis arrived, Tesobono market values in dollars suddenly fell. From December 1994 to January 1995, Tesobono yields jumped from 8 to 24 percent, and several of the interim offerings failed. The fall in market value reduced the value of the collateral and triggered margin calls to deliver dollars or close out the positions.

If the typical Tesobono fell by 15 percent in dollar value, the value of the collateral in the Tesobono swap of the earlier example would have fallen significantly; and a margin call would immediately have been sent to the Mexican bank. Alternatively, anticipating margin calls, the Mexican bank would immediately have sought dollar liquidity in preparation. To restore margin, the \$16 billion in swaps would instantly generate  $\$16 \times .15 = \$2.4$  billion of demand for dollars by the Mexican banks.

### *Equity Swaps*

Market participants have characterized the market in offshore Mexican equity swaps as very large, but they were not as explicit about orders of magnitude as in the case of Tesobonos, though several have claimed that up to \$3 billion notional value of such contracts existed at the time of the crisis.

With the collapse of the peso, the stock market fell immediately by about 50 percent in dollars and by 66 percent within two months. With the margin in the equity swaps more than wiped out, margin calls or anticipations of margin calls again forced the Mexican banks to rush for dollar liquidity. Taking \$3 billion as the notional value of outstanding equity swaps, this would have required the banks to find an additional \$1.5 billion at the time of the 19 December 1994 devaluation. Mexican institutions and individuals engaged in these swaps had to sell pesos to get margin or close out their positions, adding to the turmoil of the exchange and stock markets.

The total of margin calls from Tesobono and equity swaps alone was about \$4 billion. Coincidentally, this was approximately the amount by which the Banco de Mexico's reserves fell in the final attack just before the peso was allowed to float on 21 December 1994.<sup>17</sup>

### *Structured Notes*

During 1994, Mexican financial institutions took large positions in structured notes with investment houses in New York.<sup>18</sup> Because the notes were reported by the banks as dollar assets, however, the accounting rules in Mexico allowed them to be booked as dollar positions, so that they were not counted

17. In addition, other Mexico-oriented derivative products, such as Cetes swaps and Brady bond swaps, also would have drawn margin calls at the same moment.

18. Most major New York financial engineering firms sold such products—e.g., Bankers Trust, Merrill Lynch, Bear Stearns, Donaldson, Lufkin, and Morgan Stanley.



against the regulatory net currency position limit of a maximum of 15 percent of capital.

The first group of these structures were known as Ajustabono structures and were first noticed when consolidated regulation was implemented in September 1994. The second group were similar to the structured note discussed earlier and came to the attention of authorities just after the December 1994 devaluation.

Ajustabonos are inflation-indexed Mexican government securities that had long been held by Mexican banks. In addition to paying a relatively fixed real interest return, Ajustabonos could be counted as foreign exchange assets in determining regulatory foreign exchange positions, so Mexican banks funded their Ajustabono positions with dollar borrowings. When real interest rates rose in 1992, Mexican banks found that their Ajustabono positions were frozen because they did not want to realize the capital losses on their investment portfolios. The solution was to contract structures with New York banks and investment houses through which the Ajustabonos could be used as collateral.

For example, a U.S. and a Mexican securities firm associated with a bank would jointly organize a company in the Caymans or in Bermuda that would agree to purchase Ajustabonos at face value, with the funding obtained from the sale of two series of securities, one senior and one junior, both denominated in dollars. Suppose that the deal involved a Mexican bank's selling \$120 million par value worth of Ajustabonos to the company. The Mexican partner might put up \$20 million and receive \$20 million par value of the junior securities, which it would sell to the Mexican bank. Denominated in dollars, the junior notes could be counted as a foreign exchange asset in determining regulatory positions. The U.S. firm would invest \$100 million and receive \$100 million par value of the senior securities. The senior securities would be designed to pay a relatively secure dollar yield, which could be paid if the exchange rate did not depreciate excessively, and would be sold for LIBOR plus. The payoff on the junior securities was like that of a structured note—if the exchange rate did not depreciate, it would pay a high yield and make good the losses on the Ajustabonos. If the exchange rate depreciated, the yield or principal of the junior note would decline according to a predetermined formula.

When the banking authorities became aware that the return on the junior notes was correlated with the peso, they required that 100 percent of the notes be covered with foreign exchange. Market sources estimate that \$2 billion of the junior notes were outstanding in 1994. The banks began to cover their positions in September 1994 and throughout the autumn, which contributed significantly to the drain on official reserves in the several months just prior to the devaluation.

The Banco de Mexico found out after the devaluation that the more general structured notes like that of the “bullish obligation” example existed in large amounts. Charged with enforcing the regulation on net foreign exchange positions of the banks, the Banco de Mexico immediately ordered the banks to cover their short dollar positions. This forced a scramble for several billion

dollars of foreign exchange during the postcollapse floating period, leading to the highly volatile and illiquid foreign exchange market that dominated the first quarter of 1995.

Thus, taken in sequence, the Ajustabono structures, swaps, and structured notes account for most of the currency market dynamics in the months surrounding the collapse of the peso. The Mexican peso crisis is an example of a systemic crisis whose dynamics were driven by a structure of outstanding derivatives. The timing and magnitude of the near-in reserve drain, the final attack on foreign exchange reserves, and the postcollapse market turbulence are explainable by the automatic credit and market risk-covering programs attached to the contracts by counterparties and regulators themselves.

#### What Does “Proper Public Debt Management” Mean in the Presence of Derivatives?

Because Mexico had issued large amounts of short-term Tesobonos that could not be rolled over in the aftermath of the devaluation, subsequent analyses have pinpointed improper public debt management as a major cause of the crisis (see, e.g., Calvo 1996; Calvo and Mendoza 1996; Cole and Kehoe 1996). The consequent policy prescription has been to restructure the public debt to longer maturities in a modern version of the nineteenth-century British prescription for virtuous public debt management: “all consols—no bills.”

The example of the Tesobono swaps, however, indicates that such a prescription can easily be circumvented. Even in the case of the relatively short term Tesobonos, the yield apparently was not sufficient to encourage foreign lenders to hold Mexico risk. Only the income-hungry Mexican banks wanted to hold the risk and were willing to accept the yields on Tesobonos that were unacceptable to foreign lenders. Thus, vis-à-vis the rest of the world, the Mexican national balance sheet was a borrower of callable dollars through the Tesobono-Tesobono swap operation. The Tesobono debt of the government was balanced by the Tesobono return claims of the Mexican banks, leaving on net only the dollar debt. The sudden calls on the Mexican banking system to deliver dollars to restore margin effectively converted the average maturity of the Tesobonos from six months to callable, and the only way to satisfy the call was to deliver official reserves.

Suppose that instead of the Tesobono issues, the Mexican government had structured its debt by issuing ten-year peso- or even dollar-denominated bonds. Foreign buyers, even more reluctant to absorb these issues than to absorb Tesobonos, would have required very high yields. Mexican banks, however, proved that they would have been willing to take the risk at lower yields than foreigners. The Mexican government, therefore, would have found a market for the longer term debt as follows. Mexican banks would have entered into total return swaps with foreign banks to receive the yield on the long-term debt and pay dollar LIBOR, delivering collateral to the foreign banks. Foreign banks would then have been willing to buy the long-term debt. Any decline in value

of the long-term debt would have instantly triggered margin calls to deliver dollars. Effectively, these operations would have converted these long-term claims against the Mexican government into short-term, perhaps callable dollar claims against the national balance sheet.

If the foreign lenders' view of the risks is that they warrant only short-term lending, a prescription to lengthen the debt is an irrelevancy. Even if it is undertaken on balance sheet, it will be undone off balance sheet.

Of course, if the government has made a strong commitment not to bail out the banking system, the construction of a national balance sheet is irrelevant; Tesobono risk or the risk of government securities with any particular features would then be priced properly by the domestic banks, and their dollar margin requirements would not be met by the central bank. The public debt could then be truly lengthened, if that is desirable.

### **7.2.6 Effects of Derivatives on the Interpretation of Balance-of-Payments Accounting**

Among the rationales for balance-of-payments accounting is to ascertain the stability of capital flows of on-balance-sheet movements of assets. Typically, balance-of-payments accounting data are used to measure how long capital will remain in a country—to distinguish “good” money from “hot” money.<sup>19</sup> Various categories of the capital accounts have been interpreted as indicative of the nature of capital inflows or outflows. Foreign direct investment, for example, has been considered a more stable form of investment than portfolio investment or the foreign acquisition of bank claims. Foreign acquisition of short-term fixed interest products is generally regarded as a speculative flow. Balance-of-payments accounts are also used to measure the foreign exchange position of a country's consolidated balance and, in times of crisis, to determine the potential outflow of foreign exchange through speculation or covering operations by holders of domestic liquid assets.

The revolution in global finance and notably the explosion in the use of derivative products have rendered the use of balance-of-payments capital account data even more problematic than it has been in the past.<sup>20</sup> Balance-of-payments accounting data use on-balance-sheet categorizations, and they are

19. Although balance-of-payments capital accounts are set up to measure cross-border changes in legal ownership of claims to assets and liabilities, the classification system for financial items is designed to bring out the motivation of creditors and debtors. See IMF (1994, xxii).

20. The usual problems concern omissions or miscategorizations of transactions. That these have been magnified in the presence of widespread use of derivatives has been duly recognized by authorities responsible for technical standards, as exemplified by the April 1996 meeting at the IMF of the Informal Group on Financial Derivatives. Nevertheless, technical discussions even now center on how to fit derivative-generated payments into standard categories such as interest vs. capital gains, the treatment of margin flows, and how to book repurchase agreements. The undermining of the meaning of the various asset categories of the capital accounts in the presence of unrecorded derivative products is not an issue under discussion.

based on value accounting principles to book and categorize asset values. They ignore almost completely the existence of derivatives and their role in reallocating who bears market risk. This would not be a problem of a magnitude greater than the normal caveats on balance-of-payments accounting data except that there has been an explosion in the use of derivative products and especially in the use of cross-border products.

For example, the acquisition of a large block of equity is classified as foreign direct investment, but a foreign buyer may be acquiring the block simply to hedge a short position in equity established through a derivative position. In the case of the equity swap described above, the foreign investment firm that sells the swap must acquire the shares to form a hedge. If the swap is large enough, the hedging operation may be booked as foreign direct investment because the offshore swap position is not included in the capital accounts, although the investment house in fact is making a short-term floating rate loan in foreign currency.

Declines in equity values or the exchange rate will then generate instantaneous exchange market pressure as margin calls are made or positions are closed. This is contrary to the general view among central banks that stock market investment will not likely generate exchange market pressure in a crisis because the losses will already have been absorbed in a resultant crash. Stock market money is therefore regarded as less hot. If the buyer of the swap is a domestic resident, the capital import effectively takes the form of short-term foreign-currency-denominated borrowing, but the leveraged equity risk, and even the long-term control, remains in the hands of the domestic resident. Thus the “direct investment” turns into the hottest of money. In a similar manner, direct investment in the form of reinvestment of profits can be converted into short-term funding through an equity swap.

Alternatively, a foreign program trader may acquire the domestic stock index in the cash market while selling forward in the offshore OTC index market. On net, he has a zero position in equities but in the balance-of-payments accounts appears as a portfolio investor in domestic equities. If the opposite positions are taken by domestic residents—a sale of equities in the cash market and a forward purchase in the derivative market—the net equity risk position for domestic residents is unchanged, though domestic residents are now in effect short-term foreign currency borrowers.

To the extent that they start with zero replacement values as in the case of swaps and forwards, derivative products do not affect measured net capital inflows or outflows, but they blur the information in subcategories of the capital accounts.<sup>21</sup> Specifically, they make a mockery of the use of capital account categories to attempt to measure the aggregate short foreign currency position of an economy.

21. An exception arises if a deposit of margin is required by a foreign counterparty; the margin will be counted as a capital export.

### 7.2.7 Conclusion

From the explosion in the use of derivative products has emerged a blind spot in both national and international surveillance of capital markets. Through derivatives both individual institutions and financial systems can be put at risk in magnitudes and from directions completely unknown to regulators. This problem arises because derivatives are ideal means of avoiding prudential regulations, given the universally slow adjustment of accounting principles to the advent of these products. On a more parochial level, the accounting principles on which the balance-of-payments data-gathering exercise is based are being made increasingly obsolete. For each country, the extent of the problem is unknown because comprehensive data on derivatives are gathered only at long intervals, and even the triennial BIS data are not broken down into those relevant for emerging market countries.

The optical illusion created by viewing the flow of capital only through the on-balance-sheet lens creates a dangerous potential for misinterpreting the implications of major events in capital markets. The information conveyed by the balance-of-payments accounts on the riskiness of the national balance sheet is confounded, so the susceptibility of an economy to capital flow reversals cannot be known. When capital flows suddenly reverse, it is difficult to know which players are driving the flows and therefore to determine the appropriate short- and long-term policy response.

This paper has provided several examples to illustrate how readily the existence of derivative products can change the meaning of capital flow data, how the derivatives may automatically generate liquidity demands in response to triggering events in financial markets, and how easy it is to attribute such responses to structural flaws elsewhere in the financial system.

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### 3. Andrew Crockett

I will not rehearse at any great length in these remarks the advantages of international capital flows. They are obvious and they have already been discussed. Capital flows give countries with development potential access to foreign savings. They ensure the more efficient use of domestic savings because investment has to yield returns that are up to international standards. They discipline economic policy. And, last but not least, they help to share and diversify risks.

Risk is an inevitable part of all economic activity. An autarkic approach, in which each country would bear all of the risks of its own domestic investment choices, would clearly be inefficient. Therefore, allowing foreign investors to assume some of the risks of domestic investment, and allowing domestic investors to take profits from risk bearing abroad, helps improve welfare.

But while we all recognize these benefits and have indeed discussed them in the course of this conference, the fact is that recent experience is not particularly comforting. Consider events going back no further than, say, the 1970s. The lending boom to Latin America was followed by the debt crisis that started in 1982 and led to the “lost decade” for economic growth. More recently we had the Mexican crisis of 1994–95, and now we have the Asian crisis. These are all episodes in which the initial advantages of capital flows, which I think were real, were followed by very painful retrenchments, which cost a lot to the countries and the investors in the countries. They cost a lot, in some cases, to the lenders, too.

Typically, these episodes have had three distinct phases. In the first, inflows of capital have built up, lasted for a number of years, and often become very

large. Economic liberalization and reform have usually acted as the initial spur to inflows. That was the case both in Latin America and in Asia. And in the general pattern, when these inflows begin and gather strength, the authorities resist currency appreciation, for understandable reasons, and accumulate reserves. Such a policy has the advantage of maintaining competitiveness better than it would otherwise be, but it also has drawbacks.

The first drawback is the cost of intervention. The interest paid on domestic currency liabilities is typically higher than that received on reserve assets, sometimes much higher. This is the so-called quasi-fiscal cost. The second drawback is that intervention can often lead to excessive domestic liquidity. Sterilization is generally not wholly effective, certainly not over prolonged periods of time. In Mexico, Malaysia, Thailand, and other countries intervention has contributed, directly or indirectly, to rapid expansion of domestic bank credit. A third drawback is that inflows may be too great, in such a short period of time, to be absorbed effectively in efficient, productive activities. They go either directly or indirectly to finance consumption—that has been the case in a number of Latin American countries—or they go into relatively low return infrastructure investment, which has been the case in certain Asian countries.

In the second phase of capital inflows, the tide begins to turn. Current account deficits widen, partly as a result of inflationary pressures driving up domestic costs and partly reflecting higher investment in infrastructure. At the beginning of this phase, authorities are not particularly worried. They may even be rather glad that the upward pressure on the currency is beginning to subside, and they may be happy to see some rundown of what they consider to be excessive reserves. Often the markets are not particularly worried in that initial turning phase either.

But then we come to the third phase of the three-phase process, which is when a crisis breaks out. At some point, the boom fades. It may be because exports or investment weaken, either from high rates to slightly lower rates, or from lower rates their growth may cease. It may be accompanied at some stage by a political trigger, but whatever it is, markets lose confidence, and there is a stampede for the exits. Countries that before had easy access to international capital markets at reasonable rates suddenly find they cannot raise capital at any price. The consequences of that can be, and have been, severe. The reduction in output below the trend level in Argentina and Mexico, for example, was probably in the region of 10 to 15 percent in the first year. A loss of confidence introduces very large risk premiums into interest rates and so strains the banking system of the countries concerned. Exchange rate adjustments may overshoot, raising the risk of inflation and increasing the debt service burden.

What I want to emphasize about this process is that the international financial markets have not exercised a progressive discipline, whereby a gradual increase in borrowing costs leads to progressively tighter constraints on the behavior of economic agents. What has happened is a discontinuity; a potentially catastrophic event that is judged to have low probability has initially

not been factored into pricing and then has been recognized only when it is too late.

What should the reaction be to this three-stage development? Some, like Prime Minister Mahathir, have called for more restrictions on capital flows. I presume everybody at this conference would feel that is neither a desirable, nor indeed a feasible, response to the situation. We need to think more carefully about risk. The existing process has three important shortcomings that need to be addressed. They happen all to begin with "P"

One is perception: markets and others need to grasp the true dimensions of risk better than they do now. One is pricing: risks need to be properly priced. One is precautions: lenders and borrowers need to take measures both to reduce the risks of a crisis and to limit the damage when things go wrong.

Let me start with *perception*. Several factors can lead to inappropriate or inaccurate perceptions of the true risks involved in international capital flows. One is that markets underestimate the scale and duration of potential shocks, as well as the potential for destabilizing dynamics.

Nearly always, when economic agents are asked to think of where things could go wrong, they cite changes in financial market situations that are much smaller than can actually occur. If you spoke to observers of the Mexican economy in the pre-1994 period, even among the minority who were prepared to accept that something might go wrong a 10 or 15 percent depreciation of the currency was seen as the likely magnitude of a possible shock. Similarly in Asia, no one imagined the scale of the financial meltdown in the economies concerned.

So I think there is an unwillingness on the part of markets to contemplate the potential scale of a disruption they might subsequently face. It is also not fully appreciated how destabilizing dynamics can accentuate market reactions when it is the private sector that holds foreign currency debt. Once expectations change, for example, when those with dollar debt suddenly seek to hedge their positions, this can add enormously to the downward pressure on the exchange rate. That has been important in Indonesia, Thailand, and some other cases.

Moreover, it is often underestimated how much time it takes to reestablish confidence, and therefore extreme values of interest rates or exchange rates can persist for longer than is anticipated by market agents.

A second perception problem is that the nature of risks can change in the course of a crisis. For example, lenders may believe they are protected against interest risk or currency risk because loans are short term or denominated in foreign currency. They may not appreciate that extreme movements in interest rates and exchange rates can convert what was formerly an adequate credit risk into a poor credit risk. So the protections that are normally put in place to match interest rate or currency exposure may simply end up converting a market rate risk into a credit risk.

Last, linkages are not always fully grasped. Contagion spreads from one



country to another. When conditions are calm policymakers in individual countries usually do not take enough account of how difficulties in a similarly placed country can affect them. However, markets that may seem to be loosely correlated in normal times can become much more closely correlated in a crisis. This needs to be borne in mind in assessing how effectively risks are diversified, in practice.

Another aspect is that external events outside the control of the country can create major common problems. For instance, if the shock is a change in the U.S. interest rate regime, then countries that consider themselves to be in distinct situations may find that they are similarly affected by developments in U.S. monetary policy.

Summing up, my point is that the first essential step is to make sure that the nature of risks is better assessed and perceived than it is at the moment.

Let me now pass on to the *pricing* of risk. Risk premiums do not appear to reflect greater risks even as a crisis approaches, but then they often overreact once the crisis strikes. Why don't they respond earlier? This is not an easy question to answer. A naive observer might expect that the greater depth and range of markets that exist nowadays would make risks more quantifiable, more tractable, and better priced than they were before. But for a number of reasons, markets are not pricing risks adequately in precrisis periods.

One such reason may be a variant of liquidity illusion. Individual investors believe that they can get out quickly, with only small losses. But in the aggregate, of course, they cannot. Paradoxically, the existence of hedging instruments may have encouraged firms to adopt riskier strategies, for example, through foreign currency borrowing, because they believe that they can hedge themselves effectively if a crisis appears imminent. A second element is the very familiar moral hazard question. There may be a greater expectation in markets that the authorities will somehow do "something" to prevent or cushion adverse developments. It is often not very clear in the minds of market participants exactly what that something is, but if there is such an expectation, the risks are seen as being less than they would be in the absence of expectations of official support.

I am sympathetic to the idea of a discontinuous regime shift of the kind that is referred to in Paul Krugman's paper (chap. 8.1). A situation that, up to a certain point, appears sustainable, and therefore attracts equilibrating behavior on the part of market agents, can, as a result of a relatively small change in the perception of the situation, result in behavior that tends to destabilize and bring about the crisis.

Last, it is worth mentioning an issue that is raised by Peter Garber (chap. 7.2): Does the greater range of derivative instruments help the unscrupulous to hide and disguise risks? It certainly could. There is a problem of opacity here, and the need to develop ways of enhancing effective disclosure, disclosure that really enables those who are observing the situation to gauge the risks that are being run.

Let me now come to the *precautions* that lenders and borrowers, in particular borrowers, can take to improve or to effectively contain the risks that are involved.

One is obviously prudent monetary policy. Crises are often preceded by earlier periods of monetary slackness. The precise signs vary. Sometimes it is too rapid expansion of bank credit, sometimes asset price bubbles, and sometimes a high level of dollar-denominated borrowing with a fixed exchange rate, which makes people think interest rates are low. It has been said at this conference that anything that grows at 15 percent (I think this was the figure used) is growing too fast. Whatever the precise figure, we have been naive in the past in looking at rapid rates of growth of variables that cannot grow indefinitely beyond the rate of the underlying economy and accepted for too long that they are sustainable. Then what happens is that there is a reluctance to tighten policy in a preemptive way when danger signals mount. Sometimes that is because of a commitment to the exchange rate, and the difficulties of getting out of such a commitment. But all of that unwillingness to react earlier makes the eventual crisis worse because the excesses accumulate longer.

I believe Lawrence Summers once said that a prudent response would be react to all adverse shocks as though they were permanent, and all positive shocks as though they were transitory. I am afraid that too often it has been the reverse, and the adjustment has not begun despite the mounting danger signals.

The second element of precautions has to be in the strengthening of financial systems, especially the banking system. Virtually all recent crises have been made worse by weak and overextended banking systems. In the end, the government typically pays for these mistakes. So there is a need to strengthen banking systems. The core principles of the Basle Committee have been mentioned. That is a start, but it is only a start. Mervyn King has reminded us why one needs to look beyond just the banking system, and beyond just banking supervision, in order to strengthen financial structures. Are enough precautions being taken to deal with worst-case scenarios? I doubt it, in many cases. Take loan-to-value ratios as an example. I have often been told by supervisors and monetary authorities: it's fine, we've enforced a loan-to-value ratio of 70 percent. Well, if the exchange rate falls by 30 percent and real estate falls by 20 percent, you've eaten up the 30 percent margin, very, very quickly.

Deeper and longer term financial markets are another important building block for a more robust system. An intrinsic problem in many emerging markets is that they are thin. They are also very short term. In Asia, long-term bond markets are not very developed. This can leave borrowers exposed to shifts in sentiment. But the development of large domestic pension funds should, over time, help to foster deeper and longer term financial markets.

Government must also avoid creating distortions that prevent the market from pricing risk properly. We have the example of the Tesobonos in Mexico, and the futures obligations in Thailand. In both cases, the market is demanding higher risk premiums, but the government is effectively underwriting the risks

by issuing short-term dollar-denominated paper, or by forward sales of foreign currency, and so on. In both cases, the risk is not effectively coming through to influence private sector lender and borrower behavior.

There needs to be an increased ability for the market to become aware of risks at an earlier stage. We have talked about the importance of the publication of key indicators. I realize that indicators alone are not going to be sufficient. I do think, however, that better information is needed and that in certain cases it would have been easier for market participants to become aware of the risks that were growing if the data had been adequately available.

But more is still needed. I would cite two dimensions on which we might think about strengthening risk awareness. One is through a more effective use of credit rating agencies. Obviously it is not possible to tell credit rating agencies what to do, but I think they have often been too unwilling to adjust their ratings downward when danger has threatened. For example, the Japanese banks were nearly all AAA, right up until 1989. In hindsight, it seems clear that there were enough danger signals by 1989 that it would have been prudent to have done at least a modest downgrade before then.

Second is the question of whether official surveillance should somehow draw attention, more than it has done, to growing dangers. This is an issue that has come up in a number of forums. I would be interested in Stanley Fischer's comments on this in connection with the Thai crisis, where a number of official agencies saw the difficulties in advance. We did at the BIS, and so did the IMF. And I am sure we both said so to the Thai authorities. How much beyond that can you go? Is it possible to draw attention to unsustainable situations as they develop? I don't have a clear answer to that. Obviously it is not the answer to make a public speech that Thailand is about to face a crisis. But whether there is some intermediate response in which greater attention can be drawn at an early enough stage that a crisis is not likely to break out in a major way is I think an issue that deserves consideration.

I want to conclude by saying that we mustn't forget that one source of uncertainty for markets is whether effective official action to deal with a crisis will be taken. By that I mean that markets are uncertain about how strong the commitment of government is, both the political will and the economic understanding, to undertake necessary and timely measures to correct an unsustainable situation. In many episodes a loss of confidence in the government's ability to take decisive action, rather than just the underlying macroeconomic situation, has either initiated or prolonged the crisis.

There is also the question of international support. Much quicker IMF action is now available, supported of course by conditionality. The international financial community has to avoid creating an impression that the Seventh Cavalry will come to the rescue automatically. There is an important advantage to what I might have called "constructive ambiguity," if that term hadn't been criticized earlier. There is also much to be said for making it clear that, while the international community is there, it is there only under strict conditionality terms.

One of the potential dangers is excess liquidity. If we are indicating to mar-

kets that liquidity will be made available, either through national authorities, through the market itself, or through the international community, too easily, then we are not doing enough to make market agents internalize the risks. The objective must be to internalize the risks by the various measures I have talked about.

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## *4. David W. Mullins, Jr.*

I would like to explore some views and concerns surrounding the recent Asian crisis. This will also reinforce a number of points raised by others.

First, the generic setting, as I understand it. On the demand side, countries want to grow. They know how to grow. For the first time in seventy-five years, there is very little debate over the type of economic system that encourages growth. To grow requires capital, typically in excess of domestic savings, even in high-savings areas such as Asia. Some of the capital can take the form of foreign direct investment, but there are limits, including political limits. So high-growth countries typically rely to some not insignificant extent on portfolio investment. This is essentially the demand side of the equation.

The supply side is driven by deeply entrenched trends. The aging populations of developed nations produce large pools of savings in search of high returns. The mathematics and economics of international portfolio diversification produce benefits that are irrefutable, and ultimately irresistible. These are some of the factors driving the supply side of the market.

Supply and demand are brought together by markets. Of course in the past it was more likely financial institutions intermediating capital flows to emerging markets. Why have markets increasingly replaced direct lending by financial institutions? Driven by advances in technology, the flexibility, relative liquidity, and efficiency of markets have proved competitively superior to the older style financial system of direct investment by banks. There are even those who argue that market discipline is superior to direct lender discipline, pointing to the relatively quick recovery of Latin America from the market crisis in 1995, compared to the lost decade of development of the 1980s following the bank debt problems in Latin America. I think this comparison omits many factors. Still, the evolving market system has generally supported strong growth in countries, while providing investors diversification and attractive risk-adjusted returns. So what's the problem?

It has been suggested that, while markets generally work very well, they don't work perfectly. In particular, some have suggested that markets may be subject to imperfections, periods of instability that can damage the real economy. Some have suggested that markets in highly developed economies might get out of line every now and then. I would suggest there is enough concern to posit this possibility for discussion. In particular, with respect to emerging

markets, it has been suggested that market discipline is highly imperfect, at times too lenient or too harsh; discipline is not well calibrated to the nature of the offense; and indeed, with contagion, harsh discipline is applied to the innocent.

A word about why contagion exists. Obviously one reason is redemptions by fund investors and the like. A more fundamental reason, though, is that contagion comes in part from sound risk management principles. An investor specializing in emerging markets who loses money in one country incurs a reduction in net worth and must reduce risk accordingly, by scaling back positions in other markets. This is in part what we call a behavioral correlation among countries that may have no fundamental economic linkages. This is simply a reality of the current market system.

Back to the issue of market dysfunction. One depiction of these emerging market crises starts with a period of what I would call “market forbearance,” analogous to the manner in which banking regulators and bank lenders forbear. Investors, ignoring a country’s problems, continue to invest, pushing prices higher, enjoying good returns. Why do they do this?

First, though aware of problems, professional investors may feel they must continue to invest and earn returns to keep up with competitors who are doing the same. Second, investors feel they are nimble enough to escape before the inevitable correction. And of course, typically following some triggering event, a change in government policy, currency regime, actions of some particularly aggressive market participants, or exodus by locals, when investors attempt to execute their escape in unison, the result is market overshooting, falling beyond the level seemingly warranted by fundamentals.

Lower market prices themselves produce economic damage, justifying lower prices, and this is the concern with overshooting. It is not benign, simply bouncing back. The concern is that the overshooting itself may produce damage and cause firms to go bankrupt, producing interruptions in production, and similar hardships, that actually damage the real economy. This is one scenario of market dysfunction. So even though markets generally work quite well, there is this concern of destabilizing market crises—runs—that may damage real economies, inflicting unwarranted pain and hardship. Accepting this possibility, what’s the solution?

A number of government officials have argued, at least in private, that there is a very straightforward solution. They have argued an analogy with the earlier financial system, the banking system. That system too was subject to imperfections in the form of destabilizing bank runs that damaged the real economy. We found a solution to that imperfection. It began as the central bank as the lender of last resort, transmuted into deposit insurance, and evolved into the federal safety net for banking institutions. In the United States, following the banking collapse of the Great Depression, this solution produced a long period of financial stability, culminating in the not too destabilizing but very costly savings and loan and banking failures of the late 1980s and early 1990s. Academics of course are highly critical, almost unanimously opposed to the fed-

eral safety net. However, despite costly episodes of moral hazard, virtually every country relies on the federal safety net to combat the potential economic damage of destabilizing bank failures. In the period of the late 1980s during the savings and loan workout, and in the early 1990s when our banking system was weak, we were paying the wages of sin, the wages of moral hazard. Nonetheless, our colleagues in other countries were asking for technical help on how they too could develop a deposit insurance system, including in European countries. So this solution is fairly well established. Why not do the same to combat capital market instability? If governments can keep banks from failing, why shouldn't governments keep markets from falling, or at least from falling so fast or so far as to cause economic damage?

In my view, a government safety net is not likely to be an effective antidote to market instability. Compared to bank rescues, the direct cost of market rescues is likely to be much greater, and the probability of success much smaller. One instructive episode was the cost and outcome of the Europeans' attempt to sustain the Exchange Rate Mechanism in 1992, not an encouraging example. It is one thing to bail out one or a few banks, and quite another to confront the accumulated mass of a market. So in my view a government safety net market support system is neither a promising nor an appropriate solution to the problem of market instability. There seems to be a surprising degree of support underneath the surface of public debate for such a solution—support not only among some public officials but among investors. Similar attitudes were expressed following the Mexican problem in 1995 and after the 1987 stock market crash.

I will confess that our case against the government safety net would be stronger if we could offer a convincingly fail-safe alternative. As of yet we have none. In my view, we are still in the early stages of our experience with these episodes. We are learning, and making progress, and I shall review briefly some prescriptions that seem promising.

Among the remedies that have been suggested are the standard bromides. Indeed, around the time of the World Bank meetings, the *Financial Times* came out with an extensive supplement, giving its solution. One might characterize its solution to these problems as the stricture that governments should not make mistakes in managing their economies. I consider this a profound observation. It is certainly true that there are lessons on economic policy to be drawn from the recent crises. We have learned that contagion is a reality, and it is important that countries be aware of their neighbor's policies. This argues for regional consultation.

But I know from working in government that, under political pressures and economic shocks, mistakes will be made. All governments and countries are likely, if not destined, to experience some episodes of bad policy, bad management, and plain bad luck. So it would be useful to have an approach to market instability likely to be robust in the face of some of these possibilities.

The second preventative that has been discussed in detail here is increased surveillance, monitoring, and transparency. I couldn't agree more: I give a

hearty two cheers for transparency, reserving the third cheer for an occasional application of opaqueness. I believe, though, that in recent episodes of market instability, the root cause was not that investors were unaware of the underlying problems. It is true that after the fact we can always specify the one critical variable, if we had only known. Let's specify these ahead of time.

While helpful, I am not overly optimistic that transparency alone will do the job, eliminating overshooting behavior. I should also mention that some countries argue the utility of limited capital controls that govern the inflow of portfolio investment. I am skeptical that capital controls will be found an effective and efficient mechanism, both to promote growth and inhibit market instability, although a number of countries seem to have performed pretty well with these controls. Those of us who oppose capital controls have a burden to explain more persuasively their disadvantages. There is growing support for limited controls, given the fact that a number of countries, for extended periods of time, seem to have done reasonably well. For a government safety net and limited capital control there is a surprising degree of support. It may be that just any approaches so universally opposed by economists can't be all bad.

There are several approaches that in my opinion would be useful. As others have noted, it would be useful for countries that depend on portfolio capital investment to focus on strengthening not only their financial policies, their currency regimes, but also their financial systems. Sound banking systems are especially important. This has been also explored by others, so I will not dwell on it.

Moreover, I believe countries dependent on portfolio capital investment should work to develop their capital markets. They need to erect the appropriate capital market infrastructure, to expand the diversity of investment vehicles including longer term investment markets as well. It is also useful for such countries to develop appropriate derivative markets, providing hedging and risk management vehicles. Such vehicles tend to weigh against mispricing, provide useful hedging opportunities for local institutions and firms, and tend to broaden the investor base, to attract investors who require such vehicles to manage risk. Derivatives also price risk and make risk more transparent. Derivatives clearly reduce the cost of risk. They allow different risks to be separated and segmented, and traded around the financial system to those willing and able to bear each risk at minimum cost. This reduces the overall cost of risk bearing. Derivatives also facilitate diversification, and diversification reduces risk. It's not this year's Nobel prize, but the earlier one given to Sharpe and Markowitz. Derivatives play a role in making markets more complete. Currently, in many emerging markets it is hard to get short, and this is one reason such markets may tend to get out of line.

More generally along these lines, some of the solutions to these problems can be found in the markets. Countries should seek to broaden and deepen the base of investors knowledgeable and confident in investing in their markets, especially those investors not themselves vulnerable to short-term capital with-

drawals. After all, there is an attractive business investing in difficult market conditions, supporting markets, and seeking to profit when stability returns. The investors attracted to this strategy tend to have a longer term perspective and more stable sources of capital. I am suggesting that countries in effect work to recruit the other side of market disturbances, by actively developing their capital markets. Relevant here are a number of points that Stephen Friedman discussed (chap. 5.3), as well as Andrew Crockett's discussion about developing longer term markets (chap. 7.3).

If a country depends on portfolio capital investment, developing the capital markets is as important as developing the real economy because it will facilitate the development of the real economy. Continuing on the investors' perspective, in my view we are still in the early stages of the development of this global market system. Countries will still want to grow rapidly. We are certainly in the early stages of international diversification of investment portfolios. The overwhelming proportion of portfolios are still invested at home. We have a lot to learn.

This recent period of instability occurred against a quite benign market environment in developed countries. Despite all the setbacks and volatility, investors still view emerging markets as perhaps the most promising investment venue in the years ahead, unique opportunities in times of difficulty. Certainly those who invested in Mexico and Latin America in 1995 have done rather well. I recognize that region had the good fortune of close proximity to an impressive engine of growth, the U.S. economy, while the Asian region has a very formidable economic competitor emerging in the neighborhood in the form of China.

Still, at a time when asset prices in developed markets seem rather high, searching for value in emerging economies, countries seeking to recover from difficulties, is a most promising activity for investors—one that should be actively encouraged.

To summarize, there are real risks, both to the countries and investors, from these sorts of market disturbances. With contagion, following sound policies provides no guarantee of protection. Indeed, some countries in this crisis, which have followed the advice of enlightened economists, appear to have been hurt worse than other countries that have behaved badly.

While we have no fail-safe remedies to offer to the problem of market disturbances, I do not think the answer lies in retreating from the global market system, or in attempting to short-circuit markets with costly government protection of questionable efficacy. A better defense, and a good offensive strategy as well, is for governments not only to pursue sound economic policies but to develop and strengthen their financial systems and capital markets. Still, this is pretty cold comfort to countries that have tried to follow such policies and now face very painful adjustments in the real economy.



## Discussion Summary

*Martin Feldstein* noted that two central policy questions had emerged from this discussion. First, what should surveillance agencies say and do in response to perceived mispricings of risk? Second, what are the advantages and disadvantages of capital controls in managing capital inflows?

*Peter Garber* commented that the source of the perceived mispricing of risks may be demand from domestic agents who are responding to the implicit protection afforded by domestic regulators rather than euphoria. In response to this implicit protection, domestic agents use derivatives to “double” their bets as their situation worsens. Accordingly, Garber agreed with the neutrality of derivatives in and of themselves but suggested that any prescription for the increased use of derivatives in developing markets is dangerous given these possibilities for the radical restructuring of risks and their associated opacity.

*Paul Krugman* noted that in recent crises, bank lending has been rational ex post given the packages of support provided to lenders. However, the obvious mispricing has been in domestic currency assets, as in Thailand, where little attention was paid to the possibility of a crisis until the last moment. Regarding the “James Dean” theory of investing noted by David Mullins, Krugman characterized this as the “greater fool” theory. In this vein, he recalled that when he asked an MBA student to ask banks that lent to Latin America in the 1980s why they lent, the common response was “We’re lending short term so we’re going to get out fine.”

*Roberto Mendoza* suggested that crises make risks look mispriced ex post. However, it is far from clear that these risks were mispriced ex ante. Indeed, Mendoza noted that any supposed mispricing has to be measured within the entire range of assets and correlations ex ante. Furthermore, he suggested that markets should remove these mispricings if they truly exist and are persistent. Mendoza also noted that the notion that private lending has been safe in recent crises is not accurate. For example, U.S. banks and firms have suffered losses in the Thai crisis either through delayed payment or failed guarantees. Finally, Mendoza agreed with Mullins’s characterization of derivatives as instruments that isolate and segment risks rather than increase systemic risks.

*Feldstein* recharacterized the question about derivatives as whether at the time of a crisis they allow governments or private agents to take actions that deepen the crisis. *Jeffrey Frankel* noted that the actions of the Thai government in the forward markets correspond to that description.

*Garber* acknowledged the advantages of derivatives in reallocating risk and making the price of risk more transparent. However, he noted that his emphasis was on private actors, such as local banks in over-the-counter markets, where their actions and net positions were made opaque as a result of using derivatives.

*Feldstein* characterized this as a disagreement between the advantages of derivatives in making the prices of risk more transparent and the use of derivatives in making the quantities or positions of economic agents more opaque.

*Mullins* suggested that even over-the-counter positions require manufacturing. Accordingly, the use of derivatives will make such positions more transparent.

*Arminio Fraga* suggested that the Mexican case may prove instructive for this question. He suggested that the absence of creditworthy counterparties was a major obstacle to shorting the peso. Consequently, there was not enough liquidity to drive down the price of the peso to reasonable levels. In fact, the entry of foreign banks in Mexico since the 1994 crisis has created much needed liquidity in that market. As such, this example suggests that the depth of derivative markets can mitigate potential crises.

*Feldstein* returned to the question of how we can recognize mispricing of risks and asked Andrew Crockett whether the BIS or IMF had inside information that led them to believe that mispricing existed.

*Crockett* responded that the BIS and IMF were concerned for a while about the Thai situation. Regarding the source of the mispricing, he suggested that many factors—including government interventions, informational symmetries, incentives, and price dynamics—can give rise to the prices of risk being wrong. Understanding these imperfections, while very difficult, is central to sorting through these questions. Additionally, derivatives exploit linkages between markets and therefore can magnify or spread these initial distortions and the associated mispricings.

*David Folkerts-Landau* returned to the benefits of using temporary capital controls within a program of broader economic liberalization. He suggested a parallel between the use of mandatory reserve requirements during extreme capital inflows and the use of limits on short positions or trading halts in developed capital markets. Such analogues should allow us to be more comfortable with the idea of capital controls.

*Sebastian Edwards* countered that while there may be an intellectual justification for temporary capital controls, this argument is very far from supporting the permanent fixture that such controls have evolved into in many Latin American countries. Edwards also agreed with Mullins's observation that the profession hasn't succeeded in making a convincing case that capital controls don't work as permanent fixtures. Edwards noted that there is some evidence that countries such as Chile have succeeded in spite of the presence of capital controls rather than because of them.

*René Stulz* emphasized that the expansion of derivative markets does face a natural limit in the need for counterparties that are sufficiently creditworthy. Additionally, he noted that a major benefit of derivatives had been overlooked. Derivatives allow firms to take additional production risks and thereby create additional value. Stulz also suggested that the questions of contagion and capital controls are intimately related. If we believe in contagion, then a substantial case can be made for capital controls. Nonetheless, contagion is easy to see but very hard to prove.

*Takatoshi Ito* concurred with Folkerts-Landau and suggested that there ex-

ists a consensus that short-term capital inflows can be dangerous when accompanied by rapid bank credit expansions. Accordingly, the emphasis should be on shifting the composition of inflows from the short term to long term by possibly adding sand to the gears in order to slow short-term flows.

*Mullins* suggested that contagion will continue to play a large role as long as markets are incomplete and individual portfolios are undiversified. Regarding the parallel between capital controls and circuit breakers, Mullins suggested that one of the lessons from his experience on the Brady Commission is that it is very difficult to stop temporary measures from becoming permanent. As a result, circuit breakers in the U.S. markets, which were intended to last two years, appear now to be permanent fixtures as are “temporary” capital controls in some countries. Regarding the Thai crisis, Mullins noted that, as in many stock bubbles, trying to short the underlying assets can prove extremely painful. Accordingly, completing markets and broadening the investor base provides the best remedy for overshooting.