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THE THEORY AND PRACTICE OF FINANCIAL
STABILITY

ANDREW CROCKETT



INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS
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PRINCETON, NEW JERSEY

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THE THEORY AND PRACTICE OF FINANCIAL STABILITY

1 Introduction and Definitions

Monetary and financial stability are of central importance to the effective functioning of a market economy. They provide the basis for rational decisionmaking about the allocation of real resources through time and therefore improve the climate for saving and investment. Their absence, moreover, creates damaging uncertainties that can lead to resource misallocation and unwillingness to enter into intertemporal contracts. In extreme cases, disruptions in the financial sector can have severe adverse effects on economic activity and even on political structures. Maintaining stability is thus a key objective of financial authorities.

Much of the writing about monetary and financial stability has been from the perspective of the causes and consequences of instability. In this respect, the present essay will be no different. In finance, as in medicine, pathology is a powerful tool for understanding physiology. Classical economics, however, does not provide a particularly rich set of paradigms for analyzing the nature and consequences of financial instability. Much of traditional theory treats the financial system as a “veil” that has no lasting consequences for the allocation of real resources. Most classical economics, moreover, examines the forces that create equilibrium in markets rather than those that create disequilibrium.

The occurrence of periodic episodes of financial turmoil has therefore usually been attributed to external shocks or to various forms of aberrant behavior (Kindleberger, 1978; Minsky, 1977, 1982). It is only relatively recently that the burgeoning finance literature has begun to provide more solid microeconomic foundations for the observed phenomena of financial instability (Gertler, 1988). At the same time, the growth and integration of world financial markets have increased the importance of actions to safeguard the continued stability of the system at large.

Helpful comments on earlier drafts were provided by Svein Andresen, Claudio Borio, Philip Davis, Peter Dittus, Willem Duisenberg, Charles Freeland, Morris Goldstein, Charles Goodhart, Mervyn King, Robert McCauley, Erik Musch, Philip Turner, and Paul Van den Bergh. The present essay is a slightly revised version of a paper that appeared in the November 1996 issue of *De Economist*, Amsterdam.

The first part of this essay will review the various reasons advanced to explain why financial markets should be particularly prone to market failure or other forms of instability. The second part will consider possible responses. How can official actions make markets work better or otherwise reduce the potential for instability? Answers to these questions lie at the core of the quest for a safe, efficient, and reliable financial system. Given the increasingly global nature of financial markets, particular stress will be laid on the international aspects of instability.

Although I shall seek to identify important sources of failure in financial markets, I shall also suggest that corrective public action will work only if it seeks to preserve market discipline. Reducing instability cannot be regarded as an objective in itself. A market economy needs mechanisms by which efficiency can be promoted and rewarded. From time to time, institutions can and should go out of business. Investors who accept risk in the hope of high returns will sometimes lose money. More generally, the changes that occur in the economic environment should have as their counterpart fluctuations in asset prices and adaptations in institutional structures.

It is helpful to begin with definitions. In the first place, a distinction should be made between monetary stability and financial stability. Monetary stability can be defined as stability in the general level of prices or, otherwise put, an absence of inflation or deflation. Financial stability refers to the smooth functioning of the institutions and markets that make up the financial system. Clearly, the two are related. Stability in one domain facilitates the achievement of stability in the other. There can be important common elements between the forces causing instability in the price level and fragility in the financial system. Nevertheless, the two phenomena are not the same. The principal focus of this essay will be financial stability, that is, the stable functioning of the intermediaries and markets that make up the financial system.

There is, as yet, no generally accepted definition of financial stability. For the purpose of this survey, I shall take it to be an absence of financial instability, and I shall define financial instability as a situation in which economic performance is potentially impaired by fluctuations in the price of financial assets or in the ability of financial intermediaries to meet their contractual obligations.

Several aspects of this definition deserve comment. First, to be a matter of concern for public policy, financial instability must be capable of having a measurable effect on economic performance (real activity or the rate of inflation). Minor fluctuations in asset prices, or difficulties

confined to a few financial intermediaries, are part of the normal functioning of competitive markets and do not merit the term “instability.” Second, it is the *ex ante* potential for economic disruption, not the actual damage *ex post* that should attract our attention. The stock market crash of October 1987, for example, had relatively little effect on the real economy. It was widely felt, however, to have carried considerable potential for danger if not skillfully handled. Third, financial instability can manifest itself either in the fragility of financial intermediaries or in excessive volatility in the prices of financial assets. Both are legitimate subjects for the attention of the authorities. Fourth and finally, instability is not the same as crisis. Much writing on the subject of financial instability has focused on extreme cases of major disruption in financial markets (Kindleberger, 1978). For each 1929, however, there are several less dramatic episodes that could have caused measurable adverse effects on the functioning of the wider economy. This essay will consider instability in general, regardless of whether it has actually developed into a serious financial panic.

2 Sources of Instability

For many years, the two standard explanations of episodes of financial distress could be characterized as “cyclical” and “monetarist.” Hyman Minsky (1977) and Charles Kindleberger (1978) have focused on the various forces contributing to cyclical excess. The process leading to a crash is usually started when some favorable event initiates a bidding-up of asset prices. Such a bidding-up is more likely to occur if a substantial period has elapsed since the last crash, and the motive of greed has gained strength relative to that of fear. Price rises lead to further buying in anticipation of a continuation of the current price trend (bandwagon effects), and paper profits make it easier for speculators to finance additional purchases on margin. Eventually, when prices reach obviously overvalued levels, or some external event occurs to puncture confidence, prices collapse, with disastrous effects on those investors, including financial intermediaries, whose portfolios were financed by borrowing.

Monetarists (for example, Milton Friedman and Anna Schwartz, 1963) consider that financial instability is not likely to arise or become serious in the absence of a disruption to the money supply. In their view, the basic cause of financial instability is to be found in monetary policy. It is mistakes in monetary policy that either initiate financial instability or cause minor disruptions to have more far-reaching consequences.

Schwartz (1986) labels as “pseudo-financial crises” those disturbances that are not accompanied by a significant decline in the quantity of money.

Neither of these interpretations is wholly satisfactory. The Minsky-Kindleberger explanation of cyclical excess leaves an uncomfortable burden to be borne by irrational or disequilibrium behavior, unsupported by any very rigorous microeconomic theory of why economic agents should behave in such a destabilizing way. The monetarist view is more self-contained theoretically but is rather limited, because it rules out *a priori* the possibility of disturbances arising from nonmonetary causes. Because the role of financial intermediaries in improving the efficiency of intertemporal trade is an important factor governing economic activity (Gertler, 1988), this is a significant omission.

In recent years, insights obtained from game theory and from the economics of decisionmaking under uncertainty have offered more satisfactory explanations of why agents act in ways that can produce instability in financial institutions (Williamson, 1987; Greenwald and Stiglitz, 1991). Enhanced understanding of the dynamic process by which markets return to equilibrium after an initial disturbance has helped explain certain types of asset-price volatility. The discussion that follows will consider, first, the sources of instability in financial intermediaries and, next, the elements that give rise to excess volatility in asset prices.

Fragility in Financial Institutions

The role of financial intermediation. A significant advance in recent years has been recognition of the role of asymmetric information in determining both the nature of financial intermediation and the vulnerability of financial intermediaries to a sudden loss of confidence. Asymmetric information gives rise to problems of adverse selection and moral hazard, both of which have long been known to the insurance industry. If the price of insurance against a particular contingency is fixed independently of the characteristics or the behavior of the insured, individuals at greatest risk will choose to insure (adverse selection). Moreover, after a contract comes into effect, insured agents have an incentive to change their behavior in ways that adversely affect the interests of the insurer (moral hazard).

George Akerlof (1970) shows that this analysis can be extended into any market where there is imperfect information about the quality of the goods being traded. Akerlof's example is the used-car market, but a similar phenomenon can be shown to operate in the market for loans

(Stiglitz and Weiss, 1981). Borrowers have better information about the risk-return characteristics of the projects in which they wish to invest than most savers have. If the market price for loans were uniform, reflecting some average risk-return combination, the interest rate would be too low for projects with high risks relative to return and too high for projects with low risk. Adverse selection would ensure that a disproportionate number of “bad” projects were presented for financing, while good projects were self-financed.

When adverse selection and moral-hazard problems are acute, the market can shrink substantially or disappear altogether. In other words, there may be no price at which buyers and sellers are willing to come together, given the uncertainty about the quality of the goods or services being traded. Such a situation naturally creates incentives for institutional mechanisms to overcome the information asymmetry that is at the root of adverse selection and problems of moral hazard. In the financial sector, such a mechanism is a financial intermediary. When ultimate lenders (depositors) pool their resources in an intermediary, they in effect engage an agent who undertakes to discriminate among different borrowers and to price loans according to their relative riskiness (Diamond, 1984). Adverse selection is, therefore, much reduced. The intermediary, moreover, is in a better position to monitor and influence a borrower’s behavior subsequent to contracting the loan and, thus, to limit moral hazard (Stiglitz and Weiss, 1983).

When the intermediary is a commercial bank, additional agency services can be offered to depositors. Illiquid loans, which previously could only be realized at short notice at a discount, can be bundled together as backing for claims that, because of the law of large numbers, are unlikely to be liquidated simultaneously. Thus, a commercial bank can be seen as contributing added value in the form of enhanced information (reduced information asymmetries) and increased liquidity. So long as lenders and borrowers have confidence in a bank’s capacity to meet its contractual obligations, this results in an improved market equilibrium. Problems arise, however, if the premise of the borrowers’ continued confidence in the bank no longer holds.

“*Runs*” on *financial intermediaries*. That loss of confidence in a bank can result in a “run” has been known for a long time. The behavioral mechanisms underlying this phenomenon, however, have been rigorously described only quite recently (Diamond and Dybvig, 1983). The vulnerability of banks results from the interaction of liquid liabilities that are repayable on demand at par and illiquid assets that can only be realized at short notice by accepting a discount on book value.

A commercial bank's portfolio is stable when withdrawals by depositors take place randomly over time and assets are held to term. With a stable deposit base, a commercial bank can hold enough liquidity to meet normal withdrawals (plus a safety margin to allow for fluctuations) and can invest the rest of its assets in less liquid but higher yielding assets. The return on these assets enables the bank to compete in the market for deposits by offering an attractive package of liquidity, interest return, and in-kind services. So long as bank depositors retain confidence in the bank's solvency, and in the willingness of other depositors to limit their withdrawals, the situation remains in equilibrium.

If something happens to accelerate the rate of deposit withdrawals, however, it becomes rational for all depositors to seek to withdraw their deposits. This is because they all know that if withdrawals continue, the bank will be forced to sell illiquid assets, incurring losses and eroding its capital. Even if a depositor believes the bank to be fully solvent under normal withdrawal conditions, and even if all depositors recognize that their collective interest would be served by continuing to hold their deposits, they may still withdraw them. This is because the value of the bank is subject to multiple equilibria (Diamond and Dybvig, 1983). Deposits with the bank are worth their face value under a good equilibrium and worth something less under a bad equilibrium.

Why, one might ask, do depositors not take steps to ensure a good equilibrium, since the choice of outcomes is the result of their decisions? The reason lies in the difficulty of collective action, graphically illustrated in the well-known prisoners' dilemma (Luce and Raiffa, 1957). Two prisoners, accused of a crime and held separately, believe they can be acquitted if they both deny complicity. They also know, however, that if convicted, the one that first confesses and implicates his accomplice will receive a more lenient sentence. In such circumstances, it may be rational for each to confess even though they could have achieved a better outcome through collusion.

Bank depositors, concerned about a possible run on their bank, find themselves in a similar position. If they were able to engage in binding collusion, they would gain collectively by agreeing to refrain from precipitate withdrawals. This is because everyone knows that the value of the bank will be greater if it is allowed to hold its assets to term. Because depositors cannot collude, however, their individual interest lies in each withdrawing his or her deposit first, while the bank is still able to pay. Even if a depositor judges a bank to be fundamentally sound, it may still be rational to withdraw a deposit if others are withdrawing and the bank is likely to be insolvent under "fire-sale" conditions.

The formal literature has, for understandable reasons, focused on “bank runs,” for which liabilities are redeemable on demand. Conceptually, however, a similar problem arises whenever imperfect marketability of assets is associated with liabilities that have a shorter maturity. The lender that declines to roll over financing first will be able to run for safety before cash-flow difficulties become insurmountable. This argument implies that the Diamond-Dybvig model can be applied more widely than simply to banks, albeit with different degrees of force.

The fact that financial intermediation is, at root, a response to information asymmetries and is a way of dealing with adverse selection and problems of moral hazard, suggests an alternative way of defining the phenomenon of financial instability. Frederic Mishkin (1991, p. 7) defines a financial crisis as “a disruption to financial markets in which adverse selection and moral-hazard problems become much worse, so that financial markets are unable to channel funds efficiently to those who have the most productive investment opportunities.” This is a rather more precise way of explaining the generalized loss of confidence that lies behind the rush for “secure” assets and the disintermediation that characterizes periods of extreme financial stress in the banking system. It identifies the channel by which financial markets can “seize up,” potentially causing a cumulative decline in economic activity.

Problems of asset quality. If the dynamics of financial runs have become better understood as a result of advances in finance theory, what of the factors *initiating* episodes of financial instability? Fears of loss of liquidity sustain and intensify runs, but what causes the erosion of confidence in the first place? Typically, banks get into trouble because of deteriorating asset quality. They lend to finance activities that generate handsome profits during good economic times but that turn out to be vulnerable when underlying economic conditions change. The realization that a bank is sitting on a growing portfolio of bad loans is usually the source of initial concern.

Why do banks go on making credit judgments that turn bad? Doubtless, part of the explanation lies with fading recollections of previous bad experiences (Kindleberger, 1978). Recent writing, however, has also revealed the systematic influence of other phenomena related to disaster myopia, herd behavior, perverse incentives, the principal-agent problem, and negative externalities. Although all of these aspects of behavior have a component of simple irrationality, all are fundamentally more complex. Moreover, they all can arise independently of any perverse incentives introduced by government intervention (such as deposit insurance). Of course, expectations that the authorities will

rescue financial players from the consequences of their mistakes can make the problem much worse.

Disaster myopia occurs when lenders' assessment of the potential distribution of economic outcomes (subjective probabilities) differs from reality (objective probabilities). Disaster myopia may arise for a variety of reasons apart from simple lack of foresight. Disastrous outcomes may occur so infrequently, for example, that it is impossible to assign any meaningful actuarial probability to their future incidence (Guttentag and Herring, 1984). Or a change in policy regime may push economic conditions outside the boundaries that were taken into account when lending decisions were made. In the terminology of Frank Knight (1985), the possibility of such outcomes belongs to the category of uncertainty, which is inherently unmeasurable, rather than to that of risk, which can be calculated actuarially. In such circumstances, financial intermediaries may find that it is not worth devoting scarce management time to analyzing such eventualities. They may assume, moreover, that a disaster will call forth countervailing action by the authorities that is designed to stave off its consequences. Expectations of rescue are likely to be stronger the more extreme is the disaster scenario and the greater the proportion of the financial industry that is vulnerable to it.

A different aspect of lending actions that frequently leads to difficulties is sometimes referred to as "herd behavior." Herd behavior can be a manifestation of irrationality, but it can also reflect rational maximizing under uncertainty (Davis, 1995). The fact that others are lending may be considered information concerning the creditworthiness of a potential borrower. In addition, bankers may assume that the authorities are more likely to engage in a rescue if a number of institutions have got into similar difficulties than if only one is facing failure as a result of bad lending decisions. Lastly, managerial performance is generally judged relative to some market average. The penalties for being wrong in company are generally much less than for being wrong in isolation.

A fundamental problem is that management compensation structures can generate perverse incentives, which in turn are an aspect of the familiar principal-agent problem (Ross, 1973). The principal-agent problem arises when those who make financial decisions are compensated in ways that are not fully congruent with the success of their investment decisions. Consider the case of an employee (for example, a trader or manager) who is rewarded with a bonus if an investment decision is successful (at least initially) but suffers no more than tem-

porary loss of employment if his decision results in large losses for the firm that employs him. It is rational for such an individual to favor high-return, high-risk strategies over strategies with lower risk and correspondingly lower returns. One tail of the probability distribution is effectively eliminated for the agent, although not for the principal.

Negative externalities arise when some of the costs of a firm's decisions accrue to outsiders. This can happen in any industry, but it occurs particularly in banking because of the relatively small cushion of own funds relative to total balance-sheet size. As far as the owners of a firm are concerned, all outcomes that reduce the enterprise's net worth below zero can be treated equally, because additional losses are borne by creditors or the taxpayer. The smaller a bank's net worth, the less its owners have to lose from adverse outcomes and the more inclined they will be to pursue high-risk strategies or to "gamble for resurrection" (Dewatripont and Tirole, 1994).

Principal-agent problems and negative externalities are both instances that presume moral hazard. More generally, all rational explanations of bias toward instability in financial intermediation are rooted in imperfect information. This is, in turn, related to limited *ex post* verifiability of outcomes and to costly contracting, both of which prevent the resolution of uncertainty (Townsend, 1979). If contracting were costless and all contingencies fully verifiable, the lack of perfect information *ex ante* would not matter. Contingency clauses in contracts could play the same role. For obvious practical reasons, however, economic agents are unable to build the full range of contingencies into contracts. It is simply too time consuming and expensive to design the contract and to verify that the conditions it incorporates have been met.

The behavioral mechanisms that lead to instability in financial institutions can be exacerbated by the effects of competition. Market forces, for example, may encourage disaster myopia. Those lenders that do not factor disastrous outcomes into their loan-pricing decisions will be able to undercut those that do, forcing the latter either to drop out of the market or to bring their prices into line. Losses from exceptionally adverse outcomes cannot effectively discipline decisions because they occur too infrequently to influence lending behavior.

Contagion. Another reason why the financial industry is often thought to be particularly liable to systemic instability is that it is presumed to be vulnerable to failure contagion across institutions. Contagion is usually thought to be more likely in the financial industry than elsewhere. This is so for two main reasons. First, there is a network of interlocking claims and liabilities through the interbank

market, over-the-counter derivatives transactions, and the payment and settlement system (Schoenmaker, 1996). These have become more important and more complex in recent years as national and international capital markets have become more integrated. Second, information asymmetries make it more difficult for creditors to judge the strength of a financial institution on the basis of publicly available information than to judge the strength of other industries. Creditors may therefore be inclined to take difficulties at one firm as indicative of vulnerability at other institutions that have a superficially similar business structure.

The literature on bank-failure contagion suggests several potential consequences stemming from the special conditions that apply to banks. Relative to contagion in other industries, bank-failure contagion is thought to (1) occur faster, (2) spread more broadly, (3) result in a larger number of failures, (4) result in larger losses to creditors, and (5) do more damage to the economy at large. The empirical literature does not provide a great deal of support for these propositions (Kaufman, 1994), but as Dirk Schoenmaker (1996) points out, counterfactuals are difficult to draw from a period in which official policy has been consciously directed to avoiding contagion. Contagion risk is the core of the case for official involvement, of one form or another, in the regulation and protection of the financial industry.

Payment and settlement systems. As just noted, a particular source of contagion risk arises in the context of the payment and settlement system. Banks that participate in the payment system, on their own behalf or on behalf of their customers, have credit exposures from the moment they pay out funds until the countervalue is received. A typical transaction might be one in which a bank's customer, say a pension fund, liquidates part of its portfolio of securities. On the settlement day, the buyer's bank will send a payment instruction to the pension fund's bank. The pension fund is likely to ask its bank to make the funds available during the course of the day so that it can use them (withdrawing the funds, for instance, to purchase other financial assets or invest them in the money market). The pension fund's bank will expect the outpayment to its customer to be matched by an equivalent inpayment from the buyer's bank. In cases where interbank settlement takes place on a multilateral net basis at the end of the business day, however, the failure of the buyer's bank to provide funds to cover its (net) obligation, or any other interruption in the settlement process, will expose the pension fund's bank to its counterparty in the clearing. Moreover, the bank may find itself without the funds required to meet its own settle-

ment obligations. Difficulties at one institution may thus spread rapidly to others through the patterns of interlocking payment flows.

The size of this risk has grown as traffic through the payment system has increased. The expansion of transactions in securities and foreign-exchange markets means that credit exposures in settlement systems have increased much faster than real economic activity or than the balance sheets of financial institutions (BIS, 1994a, chap. 8). In the view of several writers (Corrigan, 1996), these exposures, which often amount to a multiple of a bank's capital, have now become the greatest single threat to the maintenance of stability in the financial system.

It is not even necessary for a failure to occur to cause disruptions in the payment system. Just the fear of possible difficulties can lead to defensive actions that may create systemic "gridlock." If a bank has concerns about the health of a counterparty, it may try to protect itself by slowing down outpayments and refusing to release collateral. This can produce effects similar to a traditional bank run, in which fears of illiquidity prove self-fulfilling. Moreover, as documented by Corrigan (1996), natural disasters and computer failures can also generate interruptions in payment flows that have the potential to create wider difficulties. Because of the increased interconnectedness of financial institutions through the payment system, local problems can spread faster and more easily than in earlier years.

The links among financial institutions exist not only at the national or domestic level but increasingly also at the international level. Instead of an overarching global payment system, linkages between various domestic systems occur primarily at the level of the banking system. One general feature of cross-border payment transactions is that nonresident banks do not participate directly in domestic interbank funds transfer systems. Payments in any currency therefore tend to be executed through correspondent banks located in the country of issue. If a bank in London wants to make a dollar payment to a bank in the United States, for example, it will use its New York correspondent to do so. These correspondent banks then channel the payments through their respective domestic payment systems to the ultimate beneficiary. Because of this, and because, typically, more than one geographical area or jurisdiction is involved (as well as, in many cases, multiple currencies), the number of intermediaries involved in the settlement of cross-border transactions is usually much larger than in the domestic context, and the risks involved are more complex.

One particular category of payment-system risk that has received increased attention in recent years occurs in the settlement of foreign-

exchange transactions. The international banking community became aware of this risk, known as foreign-exchange-settlement risk, after Bankhaus Herstatt, a medium-sized Frankfurt bank, failed in 1974, causing widespread losses to counterparties. Since then, this risk has materialized in other circumstances, including the collapse of Drexel Burnham Lambert in 1990, the closure of the Bank of Credit and Commerce International in 1991, and the crisis at Barings in 1995.

Risk in foreign-exchange settlement arises because the settlement of the two legs of a foreign-exchange transaction typically takes place through different payment systems in different geographical areas and time zones. In the absence of a settlement arrangement ensuring that the final transfer of one currency will occur if and only if the transfer of the other currency also occurs, one party to a foreign-exchange trade might pay out the currency it sold but not receive the currency it bought. It might thereby lose the full principal amount involved. The scale of these potential settlement problems is demonstrated by the average daily turnover in global foreign-exchange markets, which is estimated at about \$1.2 trillion. Because each trade can involve two or more payments, daily settlement flows are likely to amount, in aggregate, to a multiple of this figure, although no comprehensive data are available. The value of these exchange-related settlements constitutes an important part of the traffic value in the domestic payment systems of every major currency.

The extent of this risk, moreover, is actually substantially greater than is suggested by estimates of daily market turnover and settlement flows. Using a proper definition and methodology for measuring foreign-exchange-settlement exposures, it can be shown that it is not just an intraday phenomenon. In practice, such exposure can last for several days. Properly measured, a bank's foreign-exchange-settlement risk can greatly exceed the value of its capital. In fact, it has been found in some cases that a bank's foreign-exchange-settlement exposure to a single counterparty can exceed its capital base.

It is now widely accepted that there is an important international dimension to the domestic payment and settlement systems of every major currency. Because these systems are interdependent, a disturbance in any one of them has the potential to affect the others significantly. Cross-border payment and settlement arrangements are an important channel through which contagion risks can manifest themselves across borders.

Nonbank financial intermediaries. The discussion thus far has focused largely on the vulnerability of the banking system to systemic instability.

But what of instability in other financial intermediaries, such as securities dealers and fund managers? Are problems at nonbank financial intermediaries inherently different from those at banks, or do they present similar threats to stability? This is an important question, because it bears on the nature and extent of the regulatory framework. It is also an increasingly complex question, because new developments in the financial sector are tending to blur the distinctions between different types of intermediaries (Borio and Filosa, 1994).

In the past, it was traditional to single out banks for special consideration, because of their central role in the payments mechanism and their role in creating (as opposed to simply intermediating) credit. It was widely assumed that difficulties at a nonbank intermediary had less potential for generating systemic difficulties. This perspective was consistent with the monetarist tradition. Now, however, there is a much greater inclination to view a wider range of financial intermediaries, whether or not they are participating directly in the payment system and whether or not they are banks, as being a possible channel for the transmission of systemic difficulties (Corrigan, 1991; Davis, 1996).

Admittedly, one source of bank vulnerability, the obligation to repay liabilities on demand at par, does not exist in most other types of financial intermediary. As noted earlier, however, any institution that has imperfectly marketable assets and that finances itself through borrowing is conceptually vulnerable to a run-like phenomenon. Nonbank financial firms can thus get into difficulties just as easily as banks can as a result of unwise investment decisions. Moreover, derivative instruments enable an institution to transform the risk profile of its portfolio so that it bears little relation to the initial risks arising in the primary business.

The failure of a nonbank intermediary can have serious effects on the real economy, both directly through its impact on the firm's own customers and indirectly through the broader impact on confidence in the financial sector. In addition, nonbank financial intermediaries are to be found on the "other side" of many large-value transactions, including those for securities, derivatives, and foreign exchange. They thus have the capacity to impart instability to the payment system. Those responsible for maintaining financial stability cannot therefore ignore nonbank financial intermediaries.

One could, indeed, go further and regard the financial position of firms and households more generally as a potential source of systemic concern. This would be in the tradition of the "debt-deflation" literature of the 1930s (Fisher, 1933; King, 1994). A number of writers have

pointed to the possibility that an excessive buildup of corporate and household debt during a period of economic expansion carries the danger of exacerbating recessionary tendencies when the downswing in a cycle comes (Kaufman, 1986; Friedman, 1991). This is because a weakening of economic activity both increases the difficulties economic agents face in servicing their outstanding debt and reduces their net worth, making it harder for them to engage in further borrowing.

There can be little doubt that excessive debt levels have a potential role to play in transmitting the effects of financial instability to the real economy (this is also true of excessive indebtedness by governments). A proper consideration of this subject, however, would require more space than is available in this essay.

Asset-Price Volatility

Not all financial instability is associated with the fragility of institutions. Instability in markets, that is, unjustified or excessive volatility of financial-asset prices, can be a matter of just as much concern. This is not only because asset-price volatility can be associated with problems for the institutions that are active in the markets concerned, but also because changes in prices of financial assets have direct effects on private-sector spending. These effects occur because of changes in the private sector's stock of wealth, because of the effect of changes in the rate of return on incentives to save and invest, and, sometimes, because of the implications of changes for business and consumer confidence more generally.

In some respects, the factors that cause volatility in asset prices are similar to those that create instability in financial institutions. As with estimates of the net worth of financial firms, the pricing of financial assets is subject to imperfect information. Neither the stream of future income nor the factors that influence the rate at which it will be discounted by the market are known to individual asset holders. This creates an "instability bias" that has the same root cause as the vulnerability of the banking system to runs. In one case, the bias manifests itself in the observable *prices* of (marketable) assets; in the other, it shows up in the *quantities* of (nonmarketable) assets (loans or deposits). The biases can in practice work to reinforce each other, as happened on a number of occasions in the 1980s and early 1990s.

Beyond this general cause, the specific determinants of asset-price volatility, and the channels by which they can affect the real economy, depend on the characteristics of the market concerned (Krugman, 1991). The two markets in which instability has traditionally been most

troublesome, and which have been the subject of most analysis, are the foreign-exchange market and the equity market. It is these markets that will be the principal focus of attention in the discussion that follows. It should nevertheless be remembered that there are other asset-market categories, for fixed-interest securities, for example, and for real assets such as commodities and real estate. Substantial movements in bond yields or in commodity prices also have the capacity to cause disturbances in real economic activity. And fluctuations in real estate prices have frequently been an important factor for the transmission of distress through the financial system (Lewis, 1994). Instability in these markets will be touched on briefly at the end of this section.

Foreign-Exchange Markets

Instability in foreign-exchange markets can be divided into two types. The first occurs in a managed-exchange-rate regime when a discrete change in a currency's external value takes place or is threatened. This is usually described as a currency crisis. The second occurs in a floating-exchange-rate regime, when the amplitude of fluctuations in the market exchange rate is greater than can be explained on the basis of fundamental economic factors. This is usually termed "excess volatility."

A currency crisis occurs when market participants lose confidence in the sustainability of a currency's current exchange rate and seek to reduce their exposure in that currency. In this respect, the mechanism is quite similar to that underlying a bank run. The most common explanation for a currency crisis is that the authorities of the country concerned have sought to peg their exchange rate at a level that is incompatible with the associated macroeconomic policies. Although the rate may be maintained for a certain period through the use of reserves or the imposition of restrictions, eventually the weight of market opinion becomes convinced that a change in the exchange rate is unavoidable.

When this happens, a crisis can develop with considerable speed. When the authorities are defending a fixed exchange rate with narrow margins, speculators have a "one-way bet" that is analogous to the decision facing bank depositors when a bank run develops. Even if the underlying position of the currency is sound, there is little to be lost by taking a short position. Moreover, if other market participants are selling, the country may be forced to devalue because it is simply unable to resist market pressure.

Some commentators have regarded speculation leading to currency realignment as fundamentally benign (Friedman, 1953). They reason that market participants pursuing self-interest are likely to have a more

realistic view than governments have of a currency's equilibrium exchange rate. By speeding up the restoration of a sustainable exchange rate, speculators can play a valuable role in overcoming political inertia and removing an obstacle to better macroeconomic policies and an improved basis for the international allocation of resources.

This position has not gone unchallenged, however. Some writers have suggested that the exchange market may be subject to multiple equilibria, in much the same way as multiple equilibria can be used to explain the phenomenon of bank runs (Eichengreen and Wyplosz, 1993). Consider a situation in which a fixed exchange rate is a feature of a government's overall economic strategy and is an important determinant of wage- and price-setting behavior. So long as the exchange-rate peg is considered "credible," the evolution of domestic factor costs is consistent with external equilibrium. If the exchange rate is changed, however, for whatever reason, a new set of expectations governs price formation and the old exchange rate ceases to be an equilibrium. In this interpretation, it is possible for market dynamics to introduce into market prices an instability that would not be there on the basis of fundamentals.

A factor that potentially exacerbates exchange-rate volatility is the ease with which financial-market participants can adjust their portfolios. The development of new instruments, the removal of exchange controls, and the dramatic reduction of transactions costs have facilitated the taking of speculative positions. James Tobin (1984) and others regard this as one cause of unnecessary exchange-rate volatility and socially questionable investment in financial activity.

How do currency crises affect the real economy? The main mechanism is through the actions the authorities have to take either to resist speculation they consider to be unjustified or to limit the extent of a devaluation that is forced on them by market pressures. In either case, domestic interest rates may have to rise sharply, slowing economic activity and creating a deterioration in the asset portfolios of financial intermediaries. The potential damage that a currency crisis can cause depends to a considerable extent on how credible domestic monetary policy is. With weak policy credibility, interest rates may have to be raised very high to protect the external value of the currency, and this may even be counterproductive if the market concludes that interest rates are not sustainable at such levels. If domestic policy credibility is reasonably good, however, a modest step change in an exchange rate may be sufficient to restore confidence and to enable interest rates to be brought down again.

Currency crises, as just defined, cannot occur when exchange rates are continuously flexible. Excess volatility, however, remains a potential problem. Short-term volatility may, as Tobin (1984) suggests, be encouraged by an increased level of trading in foreign-exchange markets and by the development of new financial instruments. It is not obvious, however, that a greater volume of trading in a given market should give rise to greater price volatility. In some respects, the reverse is more in line with what theory would suggest (Bartolini and Bodner, 1996). Notwithstanding such disagreements, however, there seems to be a fairly wide consensus that short-term volatility has relatively few serious adverse effects on trade and investment, given the availability of hedging mechanisms (IMF, 1984; Gagnon, 1993).

Of more concern is the apparent tendency of flexible exchange rates to be compatible with more durable misalignments in exchange rates (Williamson, 1985). Such misalignments have a greater capacity to induce a suboptimal reallocation of resources across national boundaries and to give rise to adjustment costs when the pattern of exchange rates is eventually corrected again. They can also be a factor behind trade tensions (Kenen, 1995b). Exchange-rate misalignments under floating can be explained, to some extent, by the different speeds with which asset and goods markets return to equilibrium after an initial disturbance (Dornbusch, 1976). They may also result from the persistence of extrapolative expectations, or from the use of “chartist” models on the part of market participants (Frankel and Froot, 1990).

Of more importance in explaining medium-term swings in exchange rates, however, may be the effect of pursuing divergent macroeconomic policy mixes. These divergent policy mixes, if they are associated with changes in domestic saving and investment balances, lead to corresponding changes in balance-of-payments positions that require, in turn, accommodating exchange-rate movements. In other words, the exchange rate is reflecting an underlying divergence in the policies of the countries concerned, rather than acting as a source of instability in its own right.

Equity Markets

Instability in equity markets has not, in practice, done much measurable real economic harm over most of the postwar period. It remains, however, the genus of financial instability that most excites lay interest and that has attracted the most entertaining analytical writing (Galbraith, 1955; Kindleberger, 1978). Unlike currency crises, stock market crashes cannot easily be explained by rational speculative behavior. Market

participants are always betting against each other and not against some officially maintained disequilibrium price. Because markets tend to require compensation against risk, however, a negative shock may result in a greater price movement than a positive shock will, because heightened volatility risk will amplify the negative external shock, but it will offset the positive one (Campbell and Hentschel, 1992). This may help to explain why equity crashes tend to be more dramatic than price jumps.

There are three main explanations of why stock markets should be prone to instability: (1) irrational speculative excess, (2) instability in macroeconomic policies, and (3) internal market dynamics. Any particular episode of market instability may, of course, contain elements of all three.

Speculative excess is the interpretation that comes closest to the Minsky-Kindleberger view of cyclical fluctuations in asset prices. As memories fade of the most recent crash, and as economic recovery causes equity prices to rise, naïve investors jump on the bandwagon, intensifying an upward movement. There may be particular sectors of the market that are favored by fashion, because of their presumed special growth potential. Historically, the South Sea Company, tulip bulbs, railway stock, and high-technology companies have all been the subject of investment fads. Whatever the contributory causes, a process develops (which in extreme cases becomes a mania) that results in a bidding-up of asset prices to levels that are hard to justify on the basis of underlying fundamentals. Eventually, reality sets in and prices crash.

Why is the process not disciplined by the Darwinian mechanism that causes unsuccessful speculators to be forced out of the market by losses, while leaving successful speculators to continue their stabilizing activities? One reason is that the time interval between crashes is long enough for memories to fade and for a new cohort of inexperienced speculators to acquire wealth that can be used in unsuccessful speculation. Another is that individual economic agents, although recognizing that a crash is possible, overestimate their collective ability to liquidate their position ahead of the crowd.

Macroeconomic instability can also contribute to stock market volatility. Although macroeconomic fluctuations have obviously not been as sharp as movements in the stock market, there are reasons why changes in the overall economic climate can produce sudden and substantial movements in equity prices. Because equity prices represent the present discounted value of a future stream of earnings, they will change whenever an event occurs that changes either the expected future income stream or the rate at which it is discounted by the

market. When a major change in economic prospects occurs (an increase in energy prices, the election of a government with a new economic strategy, a change in the tax regime for investment income), the prospective future shifts in income streams “cast their shadow forward” into the current price. Moreover, when a major change in the economic climate is occurring, it can sometimes take time for market participants to realize its full significance. Then, when the market comes to such a recognition, the adjustment in prices may take place abruptly.

A final explanation for market fluctuations has been found in certain technical features of trading and market structures. Any feature that facilitates buying in a rising market and selling into a falling market has the potential to exacerbate price volatility. Dealing on credit or on margin is the most common such feature. The naïve investors whose activities are often thought to contribute to wide swings in stock prices are enabled to deal in larger amounts because of margin-dealing facilities. And when prices begin to fall, they are forced to sell by margin calls. Recent financial innovations, such as the development of derivative instruments, portfolio insurance, and computer-driven trading strategies, may make equity markets more vulnerable to dynamic instability (Brady Commission, 1988). Not all the empirical evidence points this way, however. Richard Roll (1989) finds little basis for supposing that the presence of derivatives markets helps explain international differences in the size of stock market declines in 1987.

Stock market fluctuations can also be engendered by herd behavior that is similar in nature and justification to that mentioned above for banks. An increasing proportion of equity holdings is concentrated in the hands of fund managers (Davis, 1996). Their optimum strategy, from the viewpoint of future employment prospects is not to take risks by departing too far from the market judgment. There will thus be a tendency to follow market trends, even at the cost of amplifying price fluctuations (Scharfstein and Stein, 1990).

Stock market declines have the potential to affect real economic activity through several channels. First, the fall in private-sector wealth will have a direct effect on willingness to spend out of current income. The size of this effect is probably not all that large, however, because wealth held in the form of equity represents only about a quarter of total household wealth (Kneeshaw, 1995). Moreover, the bulk of this equity is held by institutional investors, such as life-insurance and pension funds, the ultimate beneficiaries of which may not be all that sensitive to short-term fluctuations in asset prices. Estimates produced at the time of the 1987 stock market crash suggest that the negative

effect on industrial-country output from wealth effects would be less than 0.5 of 1 percent of gross domestic product (IMF, 1988).

A second channel by which economic activity is affected is through the effect of equity values on the attractiveness of acquiring physical assets (Tobin, 1969). If the market valuation of the future stream of earnings generated by a sector's assets falls, then the attractiveness of issuing common stock to invest in real assets falls, thus potentially reducing investment expenditure.

A third channel is through the effect of a stock market decline on the position of financial intermediaries. If declining equity prices reduce the net worth of financial institutions and their customers, the decline may exacerbate problems of asymmetric information and lead to a reduction in the level of financial intermediation (Bernanke and Gertler, 1989; Mishkin, 1994). This would, in turn, make it harder to mobilize funds for productive investment and would lead to a cumulative contraction in the level of output.

A fourth and last channel is through the effect of financial-market developments on the level of confidence. Since at least the time of Keynes, economists have recognized the role of confidence (or "animal spirits") in determining the level of business investment. If something happens to increase uncertainty about the future, economic agents may respond by reducing their exposure to such uncertainty, that is, by cutting back on investment spending.

Fixed-Interest and Real-Asset Markets

The exchange market and the stock market are, as noted, not the only markets in which financial assets are traded and in which fluctuations in asset prices have the potential to affect the real economy. The markets for fixed-interest securities (bonds) and real assets are also important, although they have attracted relatively less attention in the literature. The most prominent recent episode of bond-market instability occurred in early 1994, when long-term bond yields rose sharply in most major markets, raising fears that certain financial institutions might find themselves in difficulty and that the nascent economic recovery in European countries might be aborted.

The causes of instability in bond markets are broadly similar to those that lead to volatility in equity markets. Changes in the macroeconomic climate can cause investors to reevaluate their expectations for inflation and real interest rates, thus inducing sometimes abrupt changes in the price of fixed-interest securities. As in equity markets, these price movements can sometimes be accentuated by technical market features

and by the presence of extrapolative expectations on the part of investors. Among the technical factors is the possibility that holders of long-term bonds may be financing them by short-term borrowing.

The real economic consequences of instability in bond markets are again similar to those of equity markets, except that the interest-rate channel is presumably stronger. Because the volume of investment financed by bonds and long-term borrowing is typically much larger than that financed through equity issuance, a movement in bond yields has a more pervasive influence on the overall investment climate.

Instability in the prices of real assets can be a source of macroeconomic concern when the asset involved is a large component of the private sector's real wealth, when changes in the asset's price affect the profitability of different production technologies, when price movements create generalized inflationary or deflationary pressure, and when the asset plays an important role in the financial system, as, for example, a source of collateral.

Real estate prices are important for overall economic activity, because a substantial proportion of real estate holding is financed by borrowing, and real estate is used as collateral for many financial transactions. This feature of the financial system can amplify the effects of changes in interest rates on economic activity. Rising rates contribute to falling real estate values and debt-servicing difficulties on the part of borrowers. Weakness of real estate prices, in turn, leads to declining collateral values for lenders and greater fragility in the position of financial intermediaries. Falling real estate prices have contributed in no small measure to the intensification of cyclical difficulties in recent years in countries as far apart as Chile, Japan, Spain, Sweden, the United Kingdom, and the United States.

Commodity-price instability can also create difficulties when the commodity concerned is an important part of the production process and its price changes by a significant amount. The most striking recent example is to be found in the two rounds of oil-price increases in the 1970s and 1980s and the subsequent decline in real-energy prices over the past decade. Energy is such an important component in the production process that a significant change in its cost affects both the aggregate cost of production (and, therefore, measured inflation) and the relative cost of factor inputs (and, therefore, the choice of production technologies).

Increases in the cost of production require adjustments in macroeconomic policy so as to prevent the translation of an initial one-step increase in prices into a higher continuing rate of inflation. The transi-

tional effect of such measures is likely to be a decline in the level of economic activity. Changes in the *relative* cost of factors of production require shifts in resources between sectors and production technologies, changes that again are likely to result in frictional unemployment and premature obsolescence of part of the capital stock.

3 Achieving and Maintaining Financial Stability

So far, this essay has examined some of the reasons why financial institutions and markets may be subject to instability and has looked at the real economic costs such instability may impose. It is time now to look at the response of the authorities. How can stability be improved and the financial system made more resilient in the face of external shocks? Just as important, how can this be achieved while maintaining incentives to the efficient functioning of the financial sector, so as to provide innovative and cost-effective services to end users? The discussion that follows considers, first, methods to improve the stability of financial intermediaries and, next, ways to reduce excessive price volatility in financial markets.

In both parts of the discussion, it has to be remembered that increasing stability or dampening price changes are not unambiguously good. A competitive system implies change. Institutions come into existence when there is a market demand and go out of business when they are no longer profitable. Prices change when underlying conditions of supply and demand change. Changing asset prices are an important signal for the future allocation of resources, and such developments need to be fostered by the financial system. What is potentially harmful is excessive instability, or volatility in market prices that generates unnecessary uncertainties.

Financial Institutions

Safety nets. It has been recognized since at least Walter Bagehot's time (1873) that the particular nature of the banking business requires the existence of a lender of last resort to provide the assurance of stability under all conditions. Because banks are in the business of enhancing the creditworthiness and the liquidity of private financial obligations, they are vulnerable if, for whatever reason, their depositors simultaneously seek early repayment of their claims. To cite one influential authority, ". . . if private financial institutions have to absorb *all* financial risk, then the degree to which they can leverage, of necessity, will

be limited, the financial sector small, and its contribution to economic growth minimal” (Greenspan, 1995a). This is the argument for the lender-of-last-resort function of central banks, as a sort of catastrophic financial insurance coverage, which, however, should be activated only extremely rarely.

Another kind of safety net is implicit or explicit deposit insurance. If deposits are insured by an entity of unquestioned creditworthiness (which probably means, in practice, an agency of the government), then there is no reason for the sudden withdrawals that are the basis of banks’ vulnerability to runs. Following the experience of the Great Depression, when there was a widespread loss of confidence in banks in the United States and one-third of all banking institutions failed, deposit insurance was introduced in the United States to avoid a repetition of such a situation. Many other advanced countries have adopted similar measures. Even in those that have not, it is now generally assumed that the authorities would take the necessary steps to see that losses suffered by retail depositors would be limited.

The generic drawback with safety-net features, whether through deposit insurance or through acceptance by the central bank of lender-of-last-resort responsibility, is that such features exacerbate the problem of moral hazard. Not only is it inherently difficult for a lender to control the behavior of an economic agent, but it is possible that incentives will be created that reduce the desire of lenders to even attempt such control, or that encourage behavior on the part of borrowers that is contrary to the interests of lenders. If banks believe they will be rescued in cases of illiquidity, they will have fewer incentives to manage their portfolios prudently. And if depositors are insured against loss, they will have little interest in the soundness of the institutions with which they place their funds.

The clearest recent example of this phenomenon is the sizable losses accumulated in the 1980s by savings and loan institutions (S & Ls) in the United States. These institutions found themselves in a weakened financial position because, following a change in the regulatory environment, the cost of their variable-rate funding had risen above the returns on their largely fixed-term assets. They were able to “gamble for resurrection,” however, by undertaking risky loans at high-interest rates. Because their capital was already largely depleted, they faced only limited further losses if their strategy was unsuccessful. At the same time, the S & Ls had little difficulty in attracting additional deposits, given the government guarantee that was, in effect, attached to them (White, 1989).

Even where there is no explicit deposit insurance, incentives may be distorted by the belief that certain institutions are too big to fail. The expectation that such a doctrine will be applied has a double drawback. It creates moral hazard and it introduces a competitive distortion between large institutions and those that depositors believe the authorities will allow to fail.

Moral hazard means that risk taking, which is the essence of financial intermediation, will not be properly priced. The resulting inefficiencies may manifest themselves in taxpayer-financed losses at failed financial institutions (Goldstein and Turner, 1996). Alternatively, and more insidiously, they may be reflected in a generalized loss of efficiency in financial intermediation. The underpricing of certain risks means that activities embodying these risks will be favored at the expense of activities that do not contain such risks.

Safety nets and the associated moral hazard have traditionally been analyzed within the context of national economic jurisdictions. This has the simplifying feature that the responsible official entity is readily identifiable. Increasingly, however, the institutions whose potential failure is of systemic concern have global operations. Assuring their prudent operation, and assigning responsibility for their support when difficulties arise, raises delicate issues of international cooperation (Greenspan, 1995a).

Interestingly, until about twenty years ago, there was virtually no international cooperation in the matter of financial-system regulation, and certainly none of a formal character. The first steps came in 1974, when, following the failure of Bankhaus Herstatt, the central banks of the Group of Ten (G-10) countries established the committee that later developed into the Basle Committee on Banking Supervision. The committee's first objective was to ensure that all internationally active banks had a clearly established "home supervisor," and that there was a well-understood division of responsibilities between home and host authorities. Later, attention was given to ensuring that capital-adequacy rules for internationally active banks were applied on a consistent basis and that they corresponded to prescribed minimum standards.

Recent years have seen increasing awareness in political circles and among the public at large of financial-system vulnerability and the potential for adverse international spillover effects. This has been prompted in part by the growing number of costly banking crises. Morris Goldstein (1996) cites evidence by the International Monetary Fund, the World Bank, and others that two-thirds of IMF member countries had experienced banking-sector crises in the 1980s and early

1990s, and that the cost of such crises in developing countries alone was as high as \$250 billion. Financial-system stability became a subject of discussion at the Group of Seven (G-7) summits, where heads of state joined a growing chorus of voices urging supervisors to intensify cooperation both internationally and among different segments of the industry (banks, securities houses, and insurance companies).

Reducing moral hazard. Awareness of moral hazard has led to a search to mitigate its consequences. Bagehot's proposal to lend only to solvent but illiquid institutions, and to do so only at a penalty rate, is one example of an attempt to counteract moral hazard. As several writers have noted, however, it is not always easy to distinguish illiquidity from insolvency (Corrigan, 1989). Because a large part of a bank's assets consists of nonmarketable loans to customers, the repayability of these loans at par cannot be known with certainty to the potential last-resort lender. The value of a bank's assets, moreover, depends on other circumstances. A loan may be sound in normal economic conditions, but not sound if financial instability leads to a decline in economic activity. A borrower may be able to meet the terms of a contract if allowed to keep the loan to maturity but unable to do so if required to repay early. In other words, a bank may be solvent if preserved as a going concern, but insolvent if liquidated precipitately (Summers, 1991). Central banks thus have no easy way of making Bagehot's distinction.

Bagehot's recommendation that last-resort lending be always at a penalty rate has also been questioned. Because the institutions requiring assistance will, by definition, be in a fragile condition, the risk is that penalty-rate financing will make their position even more untenable and will promote further withdrawals of funds. In fact, most central banks have been willing, in appropriate circumstances, to extend last-resort assistance at market rates.

Another means of limiting moral hazard is to introduce an element of uncertainty into the provision of lender-of-last-resort assistance. "Constructive ambiguity," it is argued (Corrigan, 1990), can allow a central bank to step in when systemic crisis threatens, while maintaining pressure on banks to act prudently, because they cannot be certain of being rescued. The doctrine of constructive ambiguity is a way of dealing with the time-inconsistency problem (Bernanke and Gertler, 1990). The time-inconsistency problem arises because it is in the interests of the authorities to deny, *ex ante*, a willingness to provide a safety net, but to step in if a crisis nevertheless develops. Eventually, of course, market participants are likely to become wise to the authorities' strategy and to adjust their behavior accordingly. If it is clear, however,

that members of management will always lose their jobs and that shareholders will always lose their capital in the event of a failure, moral hazard should be alleviated.

Regulation. An alternative approach to dealing with moral hazard is to influence bank behavior through regulation. The basic justification for bank regulation is that, in its absence, banks will be led, deliberately or accidentally, to take excessive risks, and that market disciplines are insufficient to prevent this. There are four complementary reasons for wanting to limit excessive risk taking by banks (Quinn, 1996): (1) to protect a bank's customers from loss (the consumer-protection argument), (2) to reduce the danger of contagion (the systemic-risk argument), (3) to avoid losses to the deposit-insurance fund or to the lender-of-last-resort (the fiscal argument), and (4) to improve the allocation of resources in the financial sector (the efficiency argument).

Two rather different approaches to bank regulation can be distinguished (Goodhart, 1996). One focuses on controlling the activities in which regulated institutions can engage; the other concentrates on ensuring that the banks are adequately capitalized against the risks they run. Following the financial collapse of the 1930s, regulation was designed to limit the competition that was perceived to have contributed to unsound practices in the preceding period. Entry to banking was controlled. In some countries, investment banking and commercial banking were strictly segregated; interest-rate ceilings were widely used, and cartel-like practices were tolerated. All these regulations added to the endowment value of a banking franchise. They strengthened the stability of the banking system in two ways. First, the restrictions on competition meant that it was relatively easy to make profits without incurring significant risks. Second, the "economic" capital of the bank (that is, its financial capital *plus* the going-concern value of its franchise) was nearly always sufficient to absorb such losses as did occur.

This form of regulation had certain economic drawbacks, which became more evident with the evolution of financial-market innovation in the 1970s and 1980s and the growing ascendancy of the free-market philosophy. First, it led to obvious inefficiencies, with lenders receiving less than a competitive rate of interest on their deposits and borrowers paying more for loans. Second, it permitted cross-subsidization of activities within the banking sector. And third, it was not sustainable in the face of financial innovation and increased competition (Hellwig, 1995). Nonbanks began to make inroads into the more profitable parts of the banks' traditional franchise, and the banks themselves sought new ways to meet this competition.

These developments undermined the protection that regulation by field of activity offered to the stability of the banking system. A more competitive environment put pressure on profits and made cross-subsidization of unprofitable activities harder to sustain. The loss of endowment income reduced the economic capital of banks by eroding franchise values. This loss of capital was made apparent in the wake of the Third World debt crisis. Previously, loan losses could be carried on a bank's books until made good by subsequent profit flows. In a more competitive environment, they risked calling the bank's solvency into question.

The debt crisis of the early 1980s came close to destabilizing the banking system in a number of major developed countries, with potentially far-reaching consequences (Cline, 1995). It added weight to the arguments for giving a new focus to the regulation of financial institutions so as to strike a better balance between ensuring stability and containing moral hazard. This new focus (which was accompanied by a shift in terminology to emphasize "supervision" rather than "regulation") was to ensure that banks had adequate capital to make them resilient to the risks they faced. Such a focus could be thought of as an attempt to overcome moral hazard by mimicking competitive behavior as it would exist in the absence of problems of asymmetric information. Under the so-called Basle Capital Convergence Accord (Basle Committee, 1988), banks were required to hold a certain minimum level of capital relative to the credit risks of their portfolio. The G-10 supervisory authorities defined eligible capital, identified the "riskiness" of different categories of assets, and determined an appropriate ratio between the two.

The promulgation of internationally accepted capital-adequacy standards was a major step forward in strengthening the international banking system. It represented, in particular, a significant advance on the preexisting situation, in which capital standards varied across national jurisdictions. Although in some countries, capital requirements were risk based, in others, they were related simply to overall balance-sheet size, and little or no account was taken of off-balance-sheet credit risks.

Criticism of regulatory standards. Risk-based capital requirements have not been without their critics, however. Objections have been raised, not so much to the principle of relating capital holding to risk, but to the way in which risks are measured and the somewhat arbitrary process by which minimum-capital levels are set. More recently, it has also been recognized that supervisory standards developed for advanced

industrial countries may need to be amplified if they are to achieve their desired effect in countries where financial systems are less advanced or are in the process of rapid change.

One problem with existing capital-adequacy regimes is that the classification of banks' assets into a limited number of categories, each of which requires a uniform capital holding, is obviously somewhat artificial. A loan to a highly rated blue-chip company is not the same as a loan to an unrated small corporation or individual borrower. The convention by which loans to sovereign entities in countries of the Organisation for Economic Co-operation and Development are zero rated, whereas loans to other sovereign borrowers carry a 100 percent risk weighting, is another obvious simplification. The absence of any formal mechanism to take into account the risk-reducing properties of a diversified portfolio of credit risks has also been questioned. Finally, there has been criticism of the focus the original accord gave to credit risk at the exclusion of market risk.

Some critics (Gehrig, 1995) have gone further and argued that risk-based capital-adequacy standards can, under certain conditions, create incentives that actually increase the vulnerability of the system. Such a situation can arise if capital requirements do not adequately reflect the relative riskiness of assets in the portfolio. It can also arise if a bank finds itself in a position with insufficient capital over and above the required minimum, for it will then face an incentive to engage in a risky strategy to augment its "free" capital.

Supervisors have been aware of these limitations from the outset but have stressed the need to find a way to strengthen the international banking system while leveling the playing field across countries (Greenspan, 1996). They have also wished to avoid taking too much discretion away from bank management, where it properly belongs. Despite the imperfections in the existing supervisory regime, the augmentation of capital to which it has led can be said to have three clear benefits: first, to increase the cushion of reserves against potential losses, thus stabilizing the system at large; second, to sensitive bank management to the need to price risk appropriately; and third, to reduce moral hazard by increasing the banks' own stake in the success of their risk-management strategy.

With the passage of time, adjustments to capital requirements have been made to respond to perceived gaps in existing standards and the evolving situation of banks. A significant recent development was the extension of capital requirements to market risk and the acceptance, with appropriate safeguards, of banks' internal models of such risks

(Basle Committee, 1996). Some have suggested that the next step should be the extension of such a strategy to credit risk (Yellen, 1996). For practical reasons, the implementation of such an approach is probably still some way off, despite the important progress made by some institutions in modeling credit risk.

Quite apart from the conceptual issues concerning the coverage and measurement of risk-based capital requirements, there are more practical issues. One concerns the adequacy of financial institutions' own internal controls. Episodes such as the Barings collapse (HMSO, 1995) and the Daiwa and Sumitomo losses have shown that operational shortcomings can easily render even sophisticated risk-monitoring systems ineffective. Another issue is that of accounting. Most bank failures result from credit losses, and many banks that have failed have shown adequate capital reserves up until the time they collapsed. This has been so because accounting practices have, in effect, allowed bad loans to be classified as good. It will be particularly important, as regulatory standards are further refined, to ensure that accounting practices are adequately stringent and internationally consistent.

Another questionable dimension of existing supervisory arrangements is their institutional coverage. The traditional distinction between banks and nonbank financial institutions (insurance companies, securities firms, and fund managers) is breaking down. New instruments and greater operating freedoms are allowing firms in different parts of the marketplace to duplicate the risk profile of institutions in other market segments. Although international financial markets are becoming increasingly integrated and global, however, regulation continues to be compartmentalized along geographical and traditional functional lines. Each national authority has its own regulatory practices and structure (although an element of harmonization for some areas is being introduced in the European Union [EU]). In many countries, moreover, separate regulatory authorities have responsibility for different market segments. Regulatory compartmentalization leads to suspicions that equality of access is not being maintained among institutions in competition with one another for similar business. More serious from the viewpoint of systemic stability is that compartmentalization can lead to a migration of business lines to market segments that are less strictly regulated.

Given this erosion of institutional boundaries, increased cooperation among regulators has become necessary to help ensure a level playing field and to avoid incentives for regulatory arbitrage (Benston, 1994). The creation of the Basle Committee on Banking Supervision in 1974 was an early recognition of the need for a coordinated approach to the

regulation of internationally active banks. Progress harmonizing the regulation of nonbanks has been slower, but supervisors of insurance companies and securities firms have now begun to strengthen their framework for international cooperation. In addition, a tripartite group has been formed to enable supervisors from the three segments to come together to explore the scope for harmonized rules and improved information sharing (Basle Committee, 1995a).

Narrow banking. Not all approaches to strengthening the resilience of the financial system rely on an officially provided safety net or a framework of regulation. Two other proposals are worth noting, both of which have attracted more support in academic than in official circles. The first is 100 percent reserve banking. Advocated a half-century ago by Henry Simons (1948) and commented on favorably by a number of subsequent writers, including Milton Friedman (1959), James Tobin (1985), and James Pierce (1991), the proposal is easily described. A category of institutions (“narrow” banks) would be authorized to accept deposits and operate the payment system. These banks, which would be unconditionally guaranteed, would be required to confine their investments to certain categories of “safe” assets (probably short-term government paper). Other financial institutions would be able to accept deposits for investment in riskier assets, but there would be no default guarantee. The absence of such a guarantee would encourage depositors to monitor the activities of such institutions closely, thus reducing the risk of moral hazard. Under this setup, it is argued, the integrity of retail deposits and the payment system would be protected by the existence of a fully secure group of intermediaries, while investors with a greater appetite for risk could satisfy it through ordinary commercial banks. The need for detailed supervision of bank activities would be sharply reduced.

The main reason why this proposal has not found favor is practical. Narrow banks would be likely to offer a much inferior interest rate to ordinary commercial banks. Uninsured institutions would thus probably retain the lion’s share of total deposits, reintroducing all the instability risks of a system without a lender-of-last-resort. Only by allowing banking crises to occur, it is argued, can the authorities create a demand for 100 percent reserve banks, and that may be a price the political system finds too high to accept.

Disclosure and transparency. A second strategy, which builds on the basic idea behind narrow banking, is to rely on enhanced disclosure standards to enforce prudent behavior and underpin market stability. In this approach, the authorities would make clear that they take no responsibility for bailing out financial institutions in difficulty, in order

to stimulate more active regulation by the market. Transparency, enforced by strict disclosure standards, would enable depositors to discriminate between risky and less risky banks and would strengthen managerial incentives by making banks' management more personally accountable when losses occur.

There is little quarrel with the principle of disclosure. Indeed, both academic writing and official reports (BIS, 1994b) have stressed the contribution that improved information can make to the effective functioning of markets. More doubtful, however, is whether enhanced disclosure can enable supervisory authorities to dispense with other forms of regulation. Only New Zealand has made a significant step in this direction (Brash, 1995). With a banking sector that is dominated by foreign banks (subject to regulation in their home jurisdictions), however, New Zealand can probably be regarded as something of a special case.

There are at least three reasons why disclosure is unlikely to be a sufficient strategy to ensure systemic stability. One is that the customers of banks will find it hard to interpret the information that is disclosed. This is particularly true for unsophisticated small depositors, but it applies in some measure to all a bank's counterparties, given the information asymmetries that dominate financial transactions. A second reason is that new instruments allow financial institutions to adjust the risk profile of their portfolios so rapidly that it would be difficult for customers to monitor risk taking on a continuous basis. A third is that systemic difficulties can spread from one institution to another through the network of interlocking claims in the interbank and derivative markets, without the danger being apparent in preexisting balance-sheet data.

A general problem of disclosure is that conventional balance sheets are becoming a less and less satisfactory representation of an institution's resilience to financial risk. A snapshot of assets and liabilities at a point in time conveys little information about how a firm's net worth is likely to change over time in response to changes in market prices or economic circumstances. This has led some to advocate "risk accounting" (Merton, 1995). There are some formidable accounting obstacles in the way of a generalized adoption of risk accounting, but this has not prevented useful steps in the direction of making risk profiles more transparent (BIS, 1994b). More recently, the Basle Committee, together with the International Organization of Securities Commissions, has issued recommendations for the disclosure of market risk (Basle Committee, 1995b).

Reducing settlement risk. As noted in the previous section, if difficulties at one financial institution were to threaten wider systemic instability, one of the most likely channels of transmission would be through the payment and settlement system. The growth of financial transactions generally means that financial intermediaries find themselves with increasingly large, although very short-term, credit exposures in the payment system. Moreover, given the complexity and unpredictability of interbank payment flows, it is extremely difficult for financial institutions to form a view of the indirect exposures they face at any one time through the settlement position of their counterparties vis-à-vis others. If a major participant in the payment system were unable to meet its payment obligations, for whatever reason, the consequences could spread quickly through the system to institutions that were many transactions distant from the original disturbance.

There are different strategies that can be adopted to manage and reduce payment-system risk, and central banks have, individually or jointly (in the context of the G-10 and EU, for example), been actively promoting payment-system reform. Ensuring that payment-system participants have the necessary incentives to control the exposures they incur, in particular by limiting the reliance on central-bank support to resolve settlement failures, is very important, especially in terms of reducing moral hazard. Participants can thereby be motivated to monitor and manage more effectively their direct exposures to counterparties. In addition, efforts can be made to reduce “involuntary” credits arising from asynchronous payments and receipts or from lags between the execution of the delivery and payment legs of transactions, particularly those relating to financial-market operations. Finally, arrangements can be implemented that limit the impact of a failure to settle by one participant on the ability of others to do likewise, typically through some form of risk sharing. Measures to reduce payment and settlement risks have been taken in various areas in recent years, including in large-value interbank funds transfer systems, in securities-settlement systems, and in clearing and settlement arrangements for derivative and foreign-exchange transactions.

Clearing systems for interbank funds transfers have traditionally settled on the books of the central bank on a multilateral net basis at fixed intervals, generally at the end of the day. At least until recently, risk management in such systems depended predominantly on membership criteria and, indirectly, on the prudential regulation and supervision of the individual participants. No mechanisms were in place to ensure that funds transfers could be settled in the event of the inability to

settle by one or more of the participants. The typical unwind provisions to deal with settlement failures in such systems would not only give rise to credit and liquidity risks for individual participating banks, they could also entail systemic repercussions, because other remaining participants could find themselves unable to fulfil their settlement obligations. Safeguards that can be introduced to limit potential systemic disturbances in such systems include the introduction of real-time monitoring facilities, the setting of caps on the bilateral and multilateral net-debit positions of participants, and, most important, liquidity-pooling and loss-sharing arrangements among participants. The G-10 central banks in 1990 issued minimum standards for the operation of cross-border and multicurrency netting schemes (BIS, 1990). These are now also being adopted in many markets for domestic payment netting systems.

An alternative way of mitigating the problems entailed by delayed net settlement is to introduce “real-time gross settlement.” Real-time gross settlement means that interbank funds transfers are settled with finality as they arise. The major advantage from real-time gross settlement is that risks become explicit and transparent, because banks must obtain liquidity either by borrowing from one another in the money market or, depending on the available facilities, from the central bank. As with other types of credit, different conditions can apply to these loans, in terms of maturities (intraday or overnight), collateral, quantitative limits, interest charges, and so forth. In contrast to multilateral net-settlement systems with end-of-day finality, banks participating in real-time gross settlement have to manage their liquidity carefully throughout the day.

A particular problem for payment-system risk, and one that could significantly contribute to the transmission of disturbances across national boundaries, arises in the context of settlement risk for foreign-exchange transactions. As noted earlier, financial liberalization, expanded cross-border capital flows, and major advances in trading technology have led to dramatic changes and growth in foreign-exchange trading in the last twenty years. Banks have upgraded their operational capacity to settle these trades, but current settlement practices generally expose each trading bank to the risk that it could pay out the funds it owes on a trade but not receive the funds it is due to receive from its counterparty. In a market estimated to have a daily turnover of about \$1.23 trillion (BIS, 1996a), such exposures could be significant for individual banks and could potentially have major systemic consequences.

To help avoid such a danger, the G-10 Committee on Payment and Settlement Systems (CPSS) has now developed a strategy for reducing

risk in foreign-exchange settlement (BIS, 1996b). Part of the problem can be dealt with by extending the operating hours of settlement systems in different time zones. More important, however, is the development of operational controls in individual firms so as to monitor exposures better. The CPSS believes that tighter internal procedures would enable financial institutions to monitor (and price) exposures that now arise in an uncontrolled way. Specific procedures, it believes, should be left to the private sector to develop.

Improving the Functioning of Financial Markets

As was made clear earlier in this essay, excessive instability in financial-asset prices can also have adverse economic consequences. There can be no dispute that markets must be allowed to respond to fundamental shifts in supply-and-demand conditions. A government cannot impose its own judgment of how rapidly prices should move or where they should come to rest. Governments do have a responsibility, however, to try to ensure that undesirable price volatility is not created by their own macroeconomic actions or by the microeconomic structure of financial markets.

Dealing with asset-price instability. It is possible to distinguish two sorts of “undesirable” price instability. One is the result of unnecessary variability in the underlying determinants of asset prices. This might occur, for example, as a result of sudden or unsustainable changes in government policies. In such a case, financial-market instability is signaling defective policies elsewhere in the system; the remedy lies in actions to improve these policies. A second kind of instability arises because imperfections occur in the price-discovery mechanism (such as bubbles or overshooting). The discussion that follows will first review certain general considerations linked to the two sources of instability, then look at the problems of dealing with excess volatility in particular markets.

Asset-price instability linked to macroeconomic policy developments is probably the more important source of instability, but there is less to be said about it than about imperfections in price discovery. Clearly, the answer lies in the pursuit of policies that are mutually consistent and sustainable over time. If anything, such policies have become more important as global capital markets have grown more integrated and new financial instruments have been developed. Financial-market integration means that the weight of funds that can be brought to bear against a policy that is perceived to be unsustainable is much greater than was hitherto possible. New derivative instruments, moreover, make

it much easier to detect and act against inconsistencies in different areas of policy, say between monetary policy and exchange-rate objectives.

Although markets have thus become more powerful in ensuring that financial prices ultimately reflect fundamental economic determinants, they do not always do so in a smooth way. Lags in perceptions may mean that a disequilibrium can exist for a while before corrective forces assert themselves, perhaps because market opinion is divided about whether or not the situation is indeed unsustainable. The risk is, however, that the necessary price adjustment will be more sudden and disruptive than it would have been had corrective action been taken earlier.

The policy lesson to be drawn from this observation is that it is wise not to take chances, even when markets seem to be temporarily benign. Among the situations in which hindsight suggests that earlier action would have helped reduce subsequent financial and economic costs are the exchange rate in Mexico in 1994 and in several exchange-rate mechanism countries in preceding years, the losses in the savings and loan industry in the United States and in the banking systems in Japan and elsewhere, and the buildup of unsustainable budget deficits in most industrial countries in the 1980s and early 1990s.

Those responsible for financial-market management can do little, beyond exhortation, to improve the implementation of macroeconomic policies. Of more direct concern to them is whether anything can be done to reduce price instability that arises as a result of market imperfections. Perhaps the most general source of market imperfection is inadequate information. The obvious remedy is to improve the quality, coverage, and timeliness of information made available to market participants, as well as to mandate disclosure standards. In markets for stocks and bonds, regulatory authorities have long prescribed rules for the provision of information in offer documents, as well as guidelines for the timely provision of information relevant to the pricing of traded securities. More recently, in response to turbulence in exchange markets, the IMF, together with other bodies such as the G-7 and G-10, has taken steps to promote more timely release of information bearing on exchange rates (Goldstein, 1996).

Another potential source of price volatility is inadequate liquidity. The development of additional sources of liquidity, through the growth of forward markets, for example, is one way of dealing with this problem. In many national markets, the authorities have fostered the deepening of markets in order to improve the conditions for the marketing of government debt. It has to be recognized, however, that

not all observers accept that additional markets and market participants lead to more stable prices. Some have suggested that the involvement of additional market-makers with an interest in maximizing turnover can foster unnecessary volatility (Tobin, 1984).

Influencing market structures. Certain features of financial markets are sometimes considered to be particularly conducive to price volatility. Leverage, especially common in financial markets, may lead to selling in a falling market and buying in a rising market, with the potential to create “bubbles” and the risk of a subsequent price collapse. When purchases are made on margin, for example, falling prices generate margin calls that can lead to further sales. One response to this is to limit margin activity. This has been done in the United States since the 1930s, although there is little empirical evidence to suggest that such measures have reduced volatility (Greenspan, 1995b).

In a similar vein, “circuit breakers” have been advocated to halt temporarily trading that may be driven by feedback rules. The hope is that by introducing a pause for reflection and the introduction of human judgment, a spiral of computer-driven selling in a falling market may be halted. The drawback to this strategy (Commodity Futures Trading Commission, 1988) is that by frustrating the price-discovery mechanism, uncertainty may be created that is even more conducive to panic selling. Circuit breakers, moreover, do not prevent off-market transactions and a continuation of the preexisting price trend.

Another proposed solution to the problem of excessive price volatility in asset markets is the introduction of turnover taxes. This proposal is nowadays associated with the name of Tobin (1991) but has, in fact, been put forward by a number of writers, including Keynes. The idea is that turnover taxes will deter speculative trading without discouraging longer-term investment decisions, for which a small turnover tax would be of little importance. At the same time, a turnover tax could serve other useful functions, such as discouraging the wasteful use of real resources in the financial industry and raising tax revenue for worthy social purposes (Kenen, 1995a). Despite these advantages, the turnover tax has not attracted much support. Both official and academic opinion remain generally skeptical (Garber and Taylor, 1995). There are doubts both about how effective such a tax would be in deterring the kinds of price movements that have been troublesome in the past and about whether it could even be made to work, given the multiplicity of alternative channels by which investors can take positions in the market.

Enhancing stability in the foreign-exchange market. How can official policies improve stability in particular financial markets? In the for-

eign-exchange market, stability can potentially be enhanced by decisions on two levels. One is through the choice of an exchange-rate regime. The other is through policies to make the chosen regime function as effectively as possible.

There has been much theoretical debate about which exchange-rate regime can best reduce unnecessary instability and foster an open international trading system. The debate on the relative merits of fixed and flexible exchange rates, or of some intermediate regime, is well known and outside the scope of this essay. The practical dilemma facing monetary authorities has been formalized by Padoa-Schioppa (1994) in his argument of the “inconsistent quartet”: that is, that the four objectives of stable exchange rates, an independent monetary policy, free trade, and full capital mobility cannot all be separately pursued.

Most major countries accept the desirability of free trade and capital flows, and most, outside the EU, wish to retain independence in their domestic monetary policies. There is, therefore, no effective alternative to the continuation of the present “mixed” system in which the leading currencies float against each other and other countries choose an exchange-rate regime they believe best suited to their particular circumstances. The question thus arises of how to promote the desired degree of stability in individual exchange rates.

Pure exchange-rate flexibility can have undesirable consequences if combined with “benign neglect” of exchange-rate levels. This became clear in the overvaluation of the U.S. dollar in the mid-1980s (Marris, 1987) and the more recent volatility in the exchange value of the Japanese yen. Nevertheless, attempts to maintain unsustainable exchange rates through intervention have often ended in costly failure.

A number of attempts have been made to develop institutional mechanisms to make floating exchange rates more stable. Among the earliest approaches was the “Guidelines for the Management of Floating Exchange Rates” put forward by the IMF in 1976 (Artus and Crockett, 1978). These sought to define the circumstances in which action to affect the exchange rate could not be justified. In the event, however, the guidelines were little used. In the mid-1980s, the G-7 countries developed a system of “indicators” to help identify unsustainable economic policies and performance and to suggest remedial action (Crockett and Goldstein, 1987). In 1994, taking up a suggestion first advocated by John Williamson (1985), the Bretton Woods Commission (1994) supported a system in which target exchange-rate zones would be used to help stabilize exchange-rate policies.

Critics of target zones argue that it is difficult to identify equilibrium exchange rates, and that even if a target zone is identified, the policies required to defend it may not necessarily be appropriate. Consider a situation in which an expansionary fiscal policy is driving up interest rates in a given country, sucking in capital from abroad and causing the exchange rate to appreciate. Should monetary policy be eased in order to limit the exchange-rate appreciation, even though the result would be to make the domestic policy mix even more expansionary? Clearly not. Proponents of target zones believe this difficulty can be circumvented by defining the policy response in a more sophisticated way, so that in a case like this one, the response indicated by exchange-rate appreciation is not monetary ease but fiscal tightening (Miller and Williamson, 1987). That then poses the question of whether pressure from a target-zone system could be sufficient to persuade parliaments and congresses to act in a timely way in fiscal matters.

The task of improving the stability of the exchange-rate system in the coming years seems likely to fall on a combination of market discipline, *ad hoc* peer pressure, and multilateral surveillance. Among the major industrial countries, this will take place in informal groupings such as the G-7, because these countries have neither the need nor the inclination to approach the IMF for conditional financial assistance. Formal target zones will probably not be used, but it seems safe to assume that the exchange rate will be one of the indicators countries look at closely in the course of macroeconomic policy discussions with trading partners.

For countries that are more vulnerable to sudden swings in market confidence, surveillance through the IMF will play a greater role in efforts to head off unsustainable exchange-rate situations, such as the one that arose in Mexico. The task is complicated, however, by the absence of agreement on exactly what constitutes an unsustainable situation. It seems to be accepted that danger signs include a sizable fiscal deficit, low levels of domestic saving, a large current-account deficit (particularly when the growth rate is low), significant borrowing in foreign currency, and a weakly capitalized domestic banking system. To facilitate a more graduated response from market discipline, the provision of more timely information of higher quality is to be encouraged.

Responding to criticism that inadequate information was provided concerning the developing unsustainability of the Mexican financial situation during 1994, the Institute of International Finance published a set of data standards for emerging economies (IIF, 1995), and the IMF issued its Special Data Dissemination Standard in April 1996. The

advantage of such initiatives is that they generate market and peer pressure for improvements in disclosure on an internationally harmonized basis. It would be wrong, however, to suppose that improving data availability is all that is required to make market discipline work effectively.

Dealing with currency crises. Beyond preventive measures, the question arises of how to react when a crisis nevertheless occurs, as it did in the case of Mexico. There are three broad strategies: (1) to organize a financial rescue, based on an IMF program; (2) to allow events to run their course, accepting the possibility of an excessive depreciation of the currency, default on external debt, or both; and (3) to arrange a rescheduling and renegotiation of existing claims along the lines of receivership proceedings in domestic financial systems. Each strategy has its advantages and drawbacks.

A financial rescue can limit the adverse effects on real living standards in the affected country and help avoid contagion elsewhere. If the financial support is based on appropriate conditions, it can also contribute to the adoption of corrective macroeconomic policies. The expectation, however, that the international community will provide emergency assistance in the event of extreme debt-servicing difficulties may increase moral hazard. It is perhaps farfetched to imagine that a government would deliberately court a financial collapse because of the availability of external assistance. It cannot be excluded, however, that capital inflows are more readily available when external investors believe they will be protected against loss.

Allowing market forces to run their course would avoid the problem of moral hazard and would, in the end, probably make economic agents, both borrowing governments and external lenders, more cautious. The downside is that a laissez-faire strategy would involve larger costs in those crises that did nevertheless occur. Currency crises would be more likely to end in default, and the accompanying depreciation of the currency would be greater. The costs in terms of lost output and added inflationary pressure would be higher than in circumstances in which international assistance was available in support of a well-designed adjustment program. A pure market approach, moreover, might add to uncertainties in international trade and investment, reducing the willingness to remove controls and limiting international investment flows.

The disadvantages of both the financial-rescue strategy and the laissez-faire solution have led to a search for alternative ways of dealing with sovereign-liquidity crises. A strategy that is superficially attractive,

although difficult to apply in practice, is to replicate the principles used in domestic bankruptcy procedures (Sachs, 1995). Bankruptcy legislation is, at root, a means of dealing with the collective-action problem that exists when a firm's assets are insufficient to cover its liabilities and the individual interest of creditors to seek rapid repayment is not in line with their collective interest to maximize the residual value of the bankrupt entity. Court administration provides a fair way of maximizing value and distributing losses among classes of creditors.

Such an approach has obvious attractions, but it is difficult, if not impossible, to apply at the sovereign level (Eichengreen and Portes, 1995). For one thing, legal frameworks differ so much from country to country that it would be very difficult to agree on a common approach to apply at the international level. For another, the ultimate sanction in a domestic bankruptcy proceeding, the takeover and liquidation of the debtor entity, is not available in the case of a sovereign country. Finally, borrowers themselves are often unwilling to see such procedures introduced for fear that they would raise the initial cost of borrowing.

Recognizing the need to develop a more structured approach to dealing with currency crises, the G-10 established a working group to provide a report on the resolution of sovereign-liquidity crises (G-10, 1996). This report concluded that it was, indeed, not practicable to establish formal bankruptcy procedures for sovereign debtors. Nevertheless, it suggested various principles that should underlie the approach to dealing with sovereign-liquidity crises, as well as a number of particular measures that could be considered.

At the broadest level, it was accepted that whatever procedures were adopted in specific cases should foster sound economic policies, minimize moral hazard, rely on market forces, build on existing contractual arrangements, and operate in a nonconfrontational manner. One method was to incorporate clauses in debt contracts that would facilitate renegotiation in case of difficulties. Such clauses could provide for the collective representation of debt holders, qualified-majority voting by creditors, and the sharing of proceeds among creditors.

When actual crises develop, the question becomes how to manage a possible suspension of payments without creating undesirable incentives to follow such a course of action. The G-10 report recognized that there may be circumstances in which the international community wishes to signal its acceptance of a temporary suspension of debt service. Moreover, when a debtor has agreed with the IMF to a well-founded adjustment program, it may be in the general interest to provide financial support for such a program, even if the debtor has

not reached full agreement with its creditors. Such “lending into arrears” could be considered the nearest analogue at the international level to court-protected “debtor-in-possession” lending under national bankruptcy provisions.

Equity and bond markets. Instability in equity and bond markets can be dealt with more briefly, because it is not generally considered to be as serious a problem as currency instability, and the number of initiatives that have been put forward to deal with it are fewer. An exception to this generally sanguine view is the case in which movements in equity and bond prices are large enough and sharp enough to pose a threat to the health of financial intermediaries. To avoid this occurrence, supervisors of financial institutions seek to ensure that firms hold sufficient capital and liquidity to meet extraordinary market conditions. One way of doing this is to ask financial intermediaries to subject their portfolios to “stress tests” to see that they are resilient to extraordinary developments outside the range of experience defined by normal confidence intervals (Group of Thirty, 1993). If individual institutions are well capitalized and their portfolios are marked to market on a continuous basis, the authorities can feel more confident about providing temporary liquidity assistance in times of exceptional market stress.

Besides strengthening the resilience of financial intermediaries, the authorities can improve stability in equity and bond markets by addressing some of the underlying factors that make for excessive price volatility. At the macroeconomic level, this means avoiding abrupt changes in policy that cause economic agents to reassess the value of debt instruments and equity. Abrupt changes become necessary when an unsustainable situation (say, a low-interest-rate environment) has been allowed to persist for too long and an initial corrective move on the part of the authorities is perceived as heralding a turning point. Something like this probably lay behind the slide in the bond market in 1994, as well as the decline in the Japanese equity market in the early 1990s. It is important to note that although a policy change may be the trigger for a market reaction, it is the earlier buildup of an unsustainable position that is responsible for the size of the subsequent correction.

Once a market correction gets under way, the potential for a self-reinforcing movement is a matter of concern. To limit such a tendency, two strategies have been proposed. Circuit breakers, discussed above, may be useful in buying time for reflection and intervention, but they may be counterproductive if economic agents are prevented artificially

from carrying out desired trades in primary markets. A more promising way to achieve financial-market stability is enhancement of disclosure. If market participants are provided with better information about trades and positions outside the cash market, they will be in a better position to anticipate the market's vulnerability to sudden price moves. An enhanced capacity to distinguish fundamental from technical causes of price movements should call forth countervailing speculation and enhance the self-stabilizing properties of the market.

4 Concluding Remarks

The integration of international capital markets and the globalization of major financial institutions have made the objective of maintaining financial stability increasingly important and increasingly complex. The network of financial relationships that link the main financial firms and markets together creates a greater potential for difficulties arising in a single firm, market, or payment system to spread elsewhere in the system. At the same time, price movements in one asset market quickly spread to other markets in different geographical areas or trading segments.

Recent theoretical work has greatly increased understanding of the forces that cause instability in the financial system. It is no longer necessary to rely on quasi-psychological explanations of why bank runs develop or why financial prices move by more than seems justified by underlying economic fundamentals. This new understanding of the microeconomics of financial-market behavior is an important tool in the policymaker's search for a system that is stable enough to facilitate intertemporal resource-allocation decisions, yet flexible enough to allow prices and institutional structures to adapt through time and to provide the proper range of incentives and disincentives for good and bad decisions.

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