

The Causes and Propagation of Financial Instability: Lessons for Policymakers

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In the last twenty years, countries throughout the world have experienced severe bouts of financial instability. Banking crises have become so common that it is the rare country that has not experienced one, while full-scale financial crises have struck some economies with devastating effects. Financial instability, although a particularly severe problem for emerging-market countries which suffer disproportionately when it occurs, has struck industrialized countries just as frequently.

Given our recent record of increased financial instability, it is no surprise that policymakers throughout the world, and especially central bankers, have become more concerned about what leads to financial instability and what can be done to prevent it. This paper examines what causes and propagates financial instability and then suggests some lessons for policymakers. A key theme of the analysis is that the root cause of financial instability is the breakdown of information flows which hinder the efficient functioning of financial markets. This information approach to understanding financial instability will enable us to see not only that policymakers have a key role in assuring that information flows well in financial markets, but also that they, and particularly central bankers, play a critical role in promoting financial stability.

Information and the financial system

Financial markets and institutions perform the essential function in an economy of channeling funds to those individuals or firms that have productive investment opportunities. If the financial system does not perform this role well, then the economy cannot operate efficiently and economic growth will be severely hampered. Indeed, the economics literature on financial repression demonstrates that an important reason why many poor countries remain poor is that their financial sectors remain underdeveloped.¹

A crucial impediment to the efficient functioning of the financial system is asymmetric information, a situation in which one party to a financial contract has much less accurate information than the other party. For example, borrowers who take out loans usually have much better information about the potential returns and risk associated with the investment projects they plan to undertake than lenders do. Asymmetric information leads to two basic problems in the financial system: adverse selection and moral hazard.

Adverse selection is an asymmetric information problem that occurs before the transaction occurs when potential bad credit risks are the ones who most actively seek out a loan. Thus, the parties who are the most likely to produce an undesirable (*adverse*) outcome are most likely to be *selected*. For example, those who want to take on big risks are likely to be the most eager to take out a loan because they know that they are unlikely to pay it back. Since adverse selection makes it more likely that loans might be made to bad credit risks, lenders may decide not to make any loans even though there are good credit risks in the marketplace. This outcome is a feature of the classic “lemons problem” analysis first described by Akerlof (1970). Clearly, minimizing the adverse selection problem requires that lenders must screen out good from bad credit risks.

Moral hazard occurs after the transaction takes place because the lender is subjected to the *hazard* that the borrower has incentives to engage in activities that are undesirable (*immoral*) from the lender’s point of view—that is, activities that make it less likely that the loan

will be paid back. Moral hazard occurs because a borrower has incentives to invest in projects with high risk in which the borrower does well if the project succeeds but the lender bears most of the loss if the project fails. Also the borrower has incentives to misallocate funds for her own personal use, to shirk and just not work very hard, or to undertake investment in unprofitable projects that increase her power or stature. The conflict of interest between the borrower and lender stemming from moral hazard (the agency problem) implies that many lenders will decide that they would rather not make loans, so that lending and investment will be at suboptimal levels.² In order to minimize the moral hazard problem, lenders must impose restrictions (restrictive covenants) on borrowers so that borrowers do not engage in behavior that makes it less likely that they can pay back the loan; then lenders must monitor the borrowers' activities and enforce the restrictive covenants if the borrower violates them.

Another concept that is very important in understanding the impediments to a well-functioning financial system is the so-called free-rider problem. The free-rider problem occurs because people who do not spend resources on collecting information can still take advantage of (a "free ride" from) the information that other people have collected. The free-rider problem is particularly important in securities markets. If some investors acquire information that tells them which securities are undervalued and then buy these securities, other investors who have not paid for this information may be able to buy right along with the well-informed investors. If enough free-riding investors can do this, the increased demand for the undervalued securities will cause their low price to be bid up to reflect the securities' full net present value given this information. As a result of all these free riders, investors who have acquired information will no longer be able to earn the entire increase in the value of the security arising from this additional information. The weakened ability of private firms to profit from producing information will mean that less information is produced in securities markets, so that the adverse selection problem, in which overvalued securities are those most often offered for sale, is more likely to be an impediment to a well-functioning securities market.

More importantly, the free-rider problem makes it less likely that securities markets will act to reduce incentives to commit moral hazard. Monitoring and enforcement of restrictive covenants are necessary to reduce moral hazard. By monitoring borrowers' activities to see whether they are complying with the restrictive covenants and enforcing the covenants if they are not, lenders can prevent borrowers from taking on risk at their expense. However, because monitoring and enforcement of restrictive covenants are costly, the free-rider problem discourages this kind of activity in securities markets. If some investors know that other securities holders are monitoring and enforcing the restrictive covenants, then they can free ride on the other securities holders' monitoring and enforcement. Once these other securities holders realize that they can do the same thing, they also may stop their monitoring and enforcement activities, with the result that not enough resources are devoted to monitoring and enforcement. The outcome is that moral hazard is likely to be a severe problem for marketable securities.

The problems created by adverse selection and moral hazard, and the related free-rider problem, are important impediments to well-functioning financial markets. Indeed, many institutional features of financial systems have developed to minimize these asymmetric information problems.

One important feature of financial systems is the prominent role played by banking institutions and other financial intermediaries that make private loans. These financial intermediaries play such an important role because they are so well-suited to reducing adverse selection and moral hazard problems in financial markets. They are not as subject to the free-rider problem and profit from the information they produce because they make private loans that are not traded. Because the loans of financial intermediaries are private, other investors cannot buy them. As a result, investors are less able to free ride off financial intermediaries and bid up the prices of the loans which would prevent the intermediary from profiting from its information production activities. Similarly, it is hard to free ride off these financial intermediaries monitoring activities when they make private loans. Financial institutions making private loans thus receive

the benefits of monitoring and so are better equipped to prevent moral hazard on the part of borrowers.³

Banks have particular advantages over other financial intermediaries in solving asymmetric information problems. For example, banks' advantages in information collection activities are enhanced by their ability to engage in long-term customer relationships and issue loans using lines of credit arrangements. In addition their ability to scrutinize the checking account balances of their borrowers provides banks with an additional advantage in monitoring the borrowers' behavior. Banks also have advantages in reducing moral hazard because, as demonstrated by Diamond (1984), they can engage in lower-cost monitoring than individuals, and because, as pointed out by Stiglitz and Weiss (1983), they have advantages in preventing risk taking by borrowers since they can use the threat of cutting off lending in the future to improve a borrower's behavior. Banks' natural advantages in collecting information and reducing moral hazard explain why banks have such an important role in financial markets throughout the world. Furthermore, the greater difficulty of acquiring information on private firms in emerging-market countries makes banks even more important in the financial systems of these countries.^{4,5}

Asymmetric information problems also explain why, as Mayer (1990) points out, securities markets are frequently a relatively unimportant source of external finance to nonfinancial businesses in industrialized countries. Clearly, the better the quality of information about firms, the more likely it is that they can issue securities to raise funds. This reality suggests why only the largest and best-known firms in industrialized countries issue securities. In emerging-market economies, information about private firms is even harder to collect than in industrialized economies and, not surprisingly, securities markets therefore play a much smaller role.

The existence of asymmetric information problems also explains why there is an important role for the government to both regulate and supervise the financial system. We have seen that minimizing adverse selection and moral hazard problems requires production of

information through screening and monitoring, and yet not enough information will be produced because of the free-rider problem. The government can help come to the rescue by imposing regulations on the financial system which encourage information production. In the securities markets, regulation usually takes the form of requiring firms issuing securities to adhere to standard accounting principles and to publicly release information about their sales, assets, and earnings. Governments also pass laws to impose stiff penalties on individuals who engage in the fraud of either hiding information or stealing profits.

Governments also impose regulations to ensure that financial institutions adhere to certain standard accounting principles and disclose a wide range of information that helps the market assess the quality of the financial institution's portfolio and the amount of the institution's exposure to risk. More public information about the risks incurred by financial institutions and the quality of their portfolios can better enable stockholders, creditors, policyholders, and depositors to monitor these institutions, and so act as a deterrent to excessive risk taking.

Although disclosure requirements of this type help increase the amount of information in the marketplace, the free-rider problem results in insufficient screening and monitoring of financial institutions by the individuals who provide them with funds. Thus, governments play a role in imposing restrictions on the asset holdings of these institutions to prevent them from taking on too much risk. Furthermore, governments impose capital requirements, particularly for banking institutions, to reduce the incentives of these institutions to take on risk. When a financial institution is forced to have a large amount of equity capital, it has more to lose if it fails and is thus less likely to engage in risky activities. In addition, equity capital in itself reduces the probability of failure because it provides a cushion to withstand adverse effects on the institution's balance sheet.

Another role that governments play in the financial system is to provide a safety net. This is especially important for banking institutions that have demandable deposits and private loans. Without a safety net, a bad shock to the economy can cause depositors to

withdraw funds not only from insolvent banks but also from healthy institutions because they cannot sort the good from the bad banks. Indeed, because banks operate on a first-come, first-served basis (the so-called sequential service constraint), depositors have a very strong incentive to show up at the bank first because if they are last on line, the bank may run out of funds and they will get nothing. Therefore, uncertainty about the health of the banking system in general in the face of an economy-wide shock can lead to “runs” on banks, both good and bad, and the failure of one bank can hasten the failure of others, leading to a contagion effect. If nothing is done to restore the public’s confidence, a bank panic can ensue in which both solvent and insolvent banks go out of business, leaving depositors with large losses.

A government safety net for depositors can short circuit runs on banks and bank panics. Deposit insurance is one form of the safety net in which depositors, sometimes with a limit to amount and sometimes not, are insured against losses due to a bank failure. With fully insured deposits, depositors don’t need to run to the bank to make withdrawals—even if they are worried about the bank’s health—because their deposits will be worth 100 cents on the dollar no matter what. Even with less than full insurance, the incentive for depositors to run to withdraw deposits when they are unsure about the bank’s health is decreased.

Deposit insurance is not the only way in which governments provide a safety net to depositors. Governments often stand ready to provide support to domestic banks when banks face runs even in the absence of explicit deposit insurance. This support is sometimes provided by lending from the central bank to troubled institutions, and is often referred to as the lender-of-last-resort role of the central bank. In other cases, funds are provided directly by the government to troubled institutions, or these institutions are taken over by the government and the government then guarantees that depositors will receive their money in full.

Although a government safety net can be quite successful at protecting depositors and preventing bank panics, it is a mixed blessing. The most serious drawback of a safety net stems from

moral hazard which arises because depositors expect that they will not suffer losses if a bank fails. Thus, depositors are less likely to impose the discipline of the marketplace on banks by withdrawing deposits when they suspect that the bank is taking on too much risk. Consequently, banks that are provided with a safety net have incentives to take on greater risks than they otherwise would. The existence of a government safety net thus creates even more reason for governments to impose regulations to restrict risk taking by financial institutions.

Furthermore, not only are government regulations needed to restrict risk taking, but supervision is required as well. Not surprisingly, banks are the most closely supervised institutions in the economy. Regular bank examinations, which allow regulatory authorities to monitor whether the bank is complying with capital requirements and restrictions on asset holdings, also function to limit moral hazard. In addition, bank examiners can assess whether the bank has the proper management controls in place to prevent fraud or excessive risk taking. With this information about a bank's activities, bank examiners can enforce capital requirements and force a bank to revise its management practices if these practices are jeopardizing the safety and soundness of the bank.

This brief survey shows that information problems are a central feature of financial systems and explains why financial systems are structured the way they are. These same informational problems explain why financial instability occurs as we will see below.

The causes of financial instability

Financial instability occurs when shocks to the financial system interfere with information flows so that the financial system can no longer do its job of channeling funds to those with productive investment opportunities. Without access to these funds, individuals and firms cut their spending, resulting in a contraction of economic activity, which can sometimes be quite severe. In order to prevent financial instability from occurring, policymakers need to understand what causes it to happen. The asymmetric information analysis

we have used to understand the structure of the financial system suggests that there are four categories of factors that lead to financial instability: increases in interest rates, increases in uncertainty, asset market effects on balance sheets, and problems in the banking sector.

Increases in interest rates

As demonstrated by Stiglitz and Weiss (1981), asymmetric information and the resulting adverse selection problem can lead to credit rationing in which some borrowers are denied loans even when they are willing to pay a higher interest rate. This occurs because individuals and firms with the riskiest investment projects are exactly those who are willing to pay the highest interest rates since if the high-risk investment succeeds, they will be the main beneficiaries. Thus, a higher interest rate leads to even greater adverse selection; that is, the higher interest rate increases the likelihood that the lender is lending to a bad credit risk. If the lender cannot discriminate among the borrowers with the riskier investment projects, it may want to cut down the number of loans it makes, which causes the supply of loans to decrease with the higher interest rate, rather than increase. Thus, even if there is an excess demand for loans, a higher interest rate will not be able to equilibrate the market because additional increases in the interest rate will only decrease the supply of loans and make the excess demand for loans increase even further.

The theory behind credit rationing can be used to show that increases in interest rates can be one factor that helps precipitate financial instability. If market interest rates are driven up sufficiently, there is a higher probability that lenders will lend to bad credit risks, those with the riskiest investment projects, because good credit risks are less likely to want to borrow while bad credit risks are still willing to borrow. Because of the resulting increase in adverse selection, lenders will want to make fewer loans, possibly leading to a steep decline in lending that will lead to a substantial decline in investment and aggregate economic activity. Indeed, theoretically, a small rise in the riskless interest rate can sometimes lead to a very large decrease in lending and even a possible collapse in the loan market.⁶

Increases in uncertainty

A dramatic increase in uncertainty in financial markets, due perhaps to the failure of a prominent financial or nonfinancial institution, a recession, political instability, or a stock market crash, makes it harder for lenders to screen out good from bad credit risks. The increase in uncertainty, therefore, makes information in the financial markets even more asymmetric and may worsen the adverse selection problem. The resulting inability of lenders to solve the adverse selection problem renders them less willing to lend, leading to a decline in lending, investment, and aggregate activity.

Asset market effects on balance sheets

The state of the balance sheet of both nonfinancial firms and banks is the most critical factor for the severity of asymmetric information problems in the financial system. Deterioration of balance sheets worsens both adverse selection and moral hazard problems in financial markets, thus promoting financial instability.

An important way that financial markets can solve asymmetric information problems is with the use of collateral. Collateral reduces the consequences of adverse selection or moral hazard because it reduces the lender's losses in the case of a default. If a borrower defaults on a loan, the lender can take title and sell the collateral to make up for the losses on the loan. Thus, if the collateral is of good enough quality, the fact that there is asymmetric information between borrower and lender is no longer as important since the loss incurred by the lender if the loan defaults is substantially reduced.

Net worth performs a similar role to collateral. If a firm has high net worth, even if it defaults on its debt payments as a result of poor investments, the lender can take title to the firm's net worth, sell it off, and use the proceeds to recoup some of the losses from the loan. In addition, the more net worth a firm has in the first place, the less likely it is to default because the firm has a cushion of assets that it can use to pay off its loans. High net worth also directly decreases the incentives for borrowers to commit moral hazard because

borrowers now have more at stake, and thus more to lose, if they default on their loans. Hence, when firms seeking credit have high net worth, the consequences of adverse selection and moral hazard are less important and lenders will be more willing to make loans.

Stock market crashes have an important role to play in promoting financial instability through the net worth effects on adverse selection and moral hazard problems described above. As emphasized by Greenwald and Stiglitz (1988), Bernanke and Gertler (1989), and Calomiris and Hubbard (1990), a sharp decline in the stock market, as in a stock market crash, can increase adverse selection and moral hazard problems in financial markets because it leads to a large decline in the market value of firms' net worth. (Note that this decline in asset values could occur either because of expectations of lower future income streams from these assets or because of a rise in market interest rates that lowers the present discounted value of future income streams.) The decline in net worth as a result of a stock market decline makes lenders less willing to lend because, as we have seen, the net worth of firms has a similar role to collateral, and when the value of collateral declines, it provides less protection to lenders so that losses from loans are likely to be more severe. In addition, the decline in corporate net worth as a result of a stock market decline increases moral hazard incentives for borrowing firms to make risky investments because these firms now have less to lose if their investments go sour. Because borrowers have increased incentives to engage in moral hazard and because lenders are now less protected against the consequences of adverse selection, the stock market decline leads to decreased lending and a decline in economic activity.

Although we have seen that increases in interest rates have a direct effect on increasing adverse selection problems, increases in interest rates also play a role in promoting financial instability through both firms' and households' balance sheets. As pointed out in Bernanke and Gertler's (1995) excellent survey of the credit view of monetary transmission, a rise in interest rates and therefore in households' and firms' interest payments, decreases firms' cash flow, which causes a deterioration in their balance sheets.⁷ As a result, adverse selection

and moral hazard problems become more severe for potential lenders to these firms and households, leading to a decline in lending and economic activity. There is thus an additional reason why sharp increases in interest rates can be an important factor leading to financial instability.

In economies in which inflation has been moderate, which characterizes most industrialized countries, many debt contracts are typically of fairly long duration. In this institutional environment, an unanticipated decline in inflation leads to a decrease in the net worth of firms. Debt contracts with long duration have interest payments fixed in nominal terms for a substantial period of time, with the fixed interest rate allowing for expected inflation. When inflation turns out to be less than anticipated, which can occur either because of an unanticipated disinflation as occurred in the United States in the early 1980s or by an outright deflation as frequently occurred before World War II in the United States, the value of firms' liabilities in real terms rises so that there is an increased burden of the debt, but there is no corresponding rise in the real value of firms' assets. The result is that net worth in real terms declines. A sharp unanticipated disinflation or deflation, therefore, causes a substantial decline in real net worth and an increase in adverse selection and moral hazard problems facing lenders. The resulting increase in adverse selection and moral hazard problems (of the same type that were discussed in assessing the effect of net worth declines earlier) will thus also work to cause a decline in investment and economic activity.

In contrast to the industrialized countries, many emerging-market countries have experienced very high and variable inflation rates, with the result that debt contracts are of very short duration. For example, in many emerging-market countries, almost all bank lending is with variable rate contracts that are usually adjusted on a monthly basis. With this institutional framework, a decline in unanticipated inflation does not have the unfavorable direct effect on firms' balance sheets that it has in industrialized countries. The short duration of the debt contracts means that there is almost no change in the burden of the debt when inflation falls because the terms of the debt contract are continually repriced to reflect expectations of

inflation. Thus, one mechanism that has played a role in low-inflation countries to promote financial instability has no role in many emerging-market countries that have experienced high and variable inflation.⁸

On the other hand, there is another factor affecting balance sheets that can be extremely important in precipitating financial instability in emerging-market countries that is not operational in most industrialized countries: unanticipated exchange rate depreciation or devaluation. Because of uncertainty about the future value of the domestic currency, many nonfinancial firms, banks, and governments in emerging-market countries find it much easier to issue debt if the debt is denominated in foreign currencies. A substantial amount of debt denominated in foreign currency was a prominent feature of the institutional structure in Chilean financial markets before its financial crisis in 1982 and in Mexico in 1994. With this institutional structure, unanticipated depreciation or devaluation of the domestic currency is another factor that can lead to financial instability in emerging-market countries and it operates in a similar fashion to an unanticipated decline in inflation in industrialized countries. With debt contracts denominated in foreign currency, when there is an unanticipated depreciation or devaluation of the domestic currency, the debt burden of domestic firms increases. Since assets are typically denominated in domestic currency, there is a resulting deterioration in firms' balance sheets and decline in net worth, which then increases adverse selection and moral hazard problems along the lines described above. The increase in asymmetric information problems leads to a decline in investment and economic activity.

Problems in the banking sector

As we have seen, banks have a very important role in financial markets since they are well-suited to engage in information-producing activities that facilitate productive investment for the economy. Thus, a decline in the ability of banks to engage in financial intermediation and make loans will lead directly to a decline in investment and aggregate economic activity.

The state of banks' balance sheets has an important effect on bank lending. If banks suffer a deterioration in their balance sheets, and so have a substantial contraction in their capital, they have two choices: either they can cut back on their lending in order to shrink their asset base and thereby restore their capital ratios, or they can try to raise new capital. However, when banks experience a deterioration in their balance sheets, it is very hard for them to raise new capital at a reasonable cost. Thus, the typical response of banks with weakened balance sheets is a contraction in their lending, which slows economic activity. Research suggests, for example, that this mechanism was operational during the early 1990s in the United States when the capital crunch led to the headwinds which hindered growth in the U.S. economy at that time.⁹

Negative shocks to banks' balance sheets can take several forms. We have already seen how increases in interest rates, stock market crashes, an unanticipated decline in inflation (for industrialized countries), or an unanticipated depreciation or devaluation (for emerging-market countries with debt denominated in foreign currencies), can cause a deterioration in nonfinancial firms' balance sheets that reduces the likelihood of their repaying their loans. Thus, these factors can help precipitate sharp increases in loan losses that increase the probability of bank insolvency.

Increases in interest rates can also have an even more direct negative effect on bank balance sheets. Because banks often are engaged in the traditional banking business of "borrowing short and lending long," they typically have a maturity mismatch with longer duration assets than liabilities. Thus, a rise in interest rates directly causes a decline in net worth because the interest-rate rise lowers the value of assets with their longer duration more than it raises the value of liabilities with their shorter duration. Therefore, even if the credit quality of bank loans were to remain unaffected, a rise in interest rates causes a decline in net worth that then leads to a decline in bank lending.

Banks in emerging-market countries face additional potential shocks that can make financial instability more likely. For example,

because emerging-market countries are often primary goods producers, they are frequently subject to large terms-of-trade shocks that can devastate banks' balance sheets whose assets are composed primarily of loans to domestic firms. The lack of asset diversification outside their country can thus be a severe problem for banks in emerging-market countries that is not present for many banking institutions in industrialized countries which do have the ability to diversify their assets across countries.¹⁰

Also banks in many emerging-market countries raise funds with liabilities that are denominated in foreign currencies. A depreciation or devaluation of the domestic currency can thus lead to increased indebtedness, while the value of the banks' assets do not rise.¹¹ The resulting deterioration in banks' equity capital can lead to substantial declines in bank lending because the resulting drop in bank capital results in a failure of banks to meet capital standards, such as the Basle requirements. The decline in bank capital then requires banks to shrink their lending until they can raise new capital to meet the capital standards.

Weak bank balance sheets can also occur because the supervisory/regulatory structure has not worked well enough to restrain excessive risk taking on the part of banks. There are two reasons why the regulatory process might not work as intended. The first is that regulators and bank managers may not have sufficient resources or knowledge to do their jobs properly. This commonly occurs after a financial liberalization in which banking institutions are given new lending opportunities. Not only do the managers of banking institutions frequently not have the required expertise to manage risk appropriately in these new lines of business, but also they lack the managerial capital to cope with the rapid growth of lending that typically follows a financial liberalization. Even if the required managerial expertise were available initially, the rapid credit growth is likely to outstrip the available information resources of the banking institution, resulting in excessive risk taking.

Not only do the new lines of business and rapid credit growth stretch the managerial resources of banks, but also they similarly

stretch the resources of bank supervisors. After a financial liberalization, bank supervisors frequently find themselves without either the expertise or the additional resources needed to appropriately monitor banks' new lending activities. The result of insufficient resources and expertise both in banks and in their supervisory institutions is that banks take on excessive risks, leading to large loan losses and a subsequent deterioration in their balance sheets.

The second reason why the regulatory process might not work as intended is explained by recognizing that the relationship between voters-taxpayers on the one hand and the regulators and politicians on the other creates a particular type of moral hazard problem, the principal-agent problem. The principal-agent problem occurs when agents have different incentives from the person they work for (the principal) and so act in their own interest rather than in the interest of their employer. Regulators and politicians are ultimately agents for voters-taxpayers (principals) because in the final analysis taxpayers bear the cost of any losses when the safety net is invoked. The principal-agent problem occurs because the agent (a politician or regulator) may not have the same incentives to minimize costs to the economy as the principal (the taxpayer).

To act in the taxpayer's interest, regulators have several tasks, as we have seen. They must set restrictions on holding assets that are too risky, impose sufficiently high capital requirements, and close down insolvent institutions. However, because of the principal-agent problem, regulators have incentives to do the opposite and engage in regulatory forbearance. One important incentive for regulators that explains this phenomenon is their desire to escape blame for poor performance by their agency. By loosening capital requirements and pursuing regulatory forbearance, regulators can hide the problem of an insolvent bank and hope that the situation will improve.¹² Another important incentive for regulators is that they may want to protect their careers by acceding to pressures from the people who strongly influence their careers, the politicians. Regulatory agencies that have little independence from the political process are therefore more vulnerable to these pressures.

Deterioration in bank balance sheets can occur either because of excessive risk taking on the part of banks as a result of inadequate bank regulation and supervision or because of negative shocks such as interest-rate rises, stock market crashes, an unanticipated decline in inflation (for industrialized countries), or an unanticipated depreciation or devaluation (for emerging-market countries with debt denominated in foreign currencies). If the deterioration in bank balance sheets is severe enough, however, it can have even more drastic effects on bank lending if it leads to bank panics, in which there are multiple, simultaneous failures of banking institutions.

Indeed, there is some possibility that, in the absence of a government safety net, contagion can spread from one bank failure to another, causing even healthy banks to fail. The source of the contagion is again asymmetric information. In a panic, depositors, fearing the safety of their deposits and not knowing the quality of the banks' loan portfolios, withdraw their deposits from the banking system, causing a contraction in loans and a multiple contraction in deposits, which then causes other banks to fail.

The disappearance of a large number of banks in a short period of time means that there is a loss of information production in financial markets and a direct loss of financial intermediation that can be done by the banking sector. The outcome is an even sharper decline in lending to facilitate productive investments, with a resulting sharp contraction in economic activity. Another negative effect on the economy occurs through the effect of a banking panic on the money supply. Because a banking panic also results in a movement from deposits to currency, the usual money-multiplier analysis indicates that the money supply will fall. The resulting decline in the money supply then leads to higher interest rates, which, as we have seen, increases adverse selection and moral hazard problems in financial markets and causes a further contraction in economic activity.

Propagation of financial instability

Now that we have examined the factors that cause financial instability, we can see how they interact to propagate this condition.

Indeed in extreme cases, these factors can interact to produce a financial crisis, an even stronger form of financial instability in which the financial system seizes up abruptly and almost stops functioning.

There are two major institutional differences in the financial markets of industrialized countries versus emerging-market countries that imply different propagation mechanisms for financial instability. As mentioned earlier, in industrialized countries where inflation typically has been low and not very variable, many debt contracts are of long duration. Furthermore, because these industrialized countries typically retain a strong currency, most debt contracts are denominated in the domestic currency. In contrast, many emerging-market countries have had high and variable inflation rates in the past and so, long-term debt contracts are too risky. The result has been a debt structure of very short duration. Given poor inflation performance, these countries also have domestic currencies that undergo substantial fluctuations in value and are thus very risky. To avoid this risk, many debt contracts in these countries are denominated in foreign currencies.

Clearly the dichotomy that emerging-market countries have short-duration debt contracts that are frequently denominated in foreign currency while industrialized countries have longer-duration debt contracts that are denominated in domestic currency is too strong. Some industrialized countries have had a substantial amount of debt denominated in foreign currency. (This was the case in the Nordic countries, for example.) The distinction between industrialized countries and emerging-market countries in terms of the institutional structure of their financial system is thus not completely clear cut: some industrialized countries have attributes of their financial structure that are typical of emerging-market countries and vice versa. Nonetheless, this dichotomy is a useful one.

These two different types of institutional structures lead to different propagation mechanisms for financial instability. Figure 1 describes the propagation mechanisms for “industrialized countries,” while Figure 2 describes the mechanisms for “emerging-market coun-

tries.” The factors causing financial instability are surrounded by ovals, whereas the effects of these factors are surrounded by boxes. The dashed lines show the propagation of financial instability.

The initial impetus for financial instability is the same for both industrialized countries and emerging-market countries as the first row of Figures 1 and 2 indicates. Four factors typically help initiate financial instability: (1) increases in interest rates, (2) a deterioration in bank balance sheets, (3) negative shocks to nonbank balance sheets such as a stock market decline, and (4) increases in uncertainty. Countries often begin experiencing major bouts of financial instability when domestic interest rates begin to rise, often with the rise initiated by interest rate increases abroad. For example, as documented in Mishkin (1991), most financial crises in the United States in the nineteenth and early twentieth centuries began with a sharp rise in interest rates that followed interest rate increases in the London markets. Similarly, the Mexican financial crisis of 1994-95 began with upward pressure on domestic interest rates following the monetary tightening in the United States beginning in February 1994. As we have seen, these rises in interest rates increased adverse selection problems in the credit markets. The rise in interest rates also increased moral hazard problems because the resulting decrease in cash flow hurt the balance sheets of nonbank firms. In addition, the increase in interest rates weakened bank balance sheets because of banks’ maturity mismatch and also led to increased moral hazard problems as indicated in the next row in Figures 1 and 2.

Also characteristic of the early stages of financial instability is a deterioration in bank balance sheets because of risky loans that have turned sour. In the recent Mexican episode, the source of these weakened balance sheets was financial liberalization that led to a rapid acceleration of bank lending, in which bank credit to the private nonfinancial business sector rose from 10 percent of GDP in 1988 to over 40 percent in 1994. This lending boom, which stressed the screening and monitoring facilities of the Mexican banks, along with the inability of the National Banking Commission in Mexico to adequately supervise these new lending activities, led to growing loan losses in the banking sector. The story in Japan leading up to

Figure 1
Propagation of Financial Instability
in Industrialized Countries

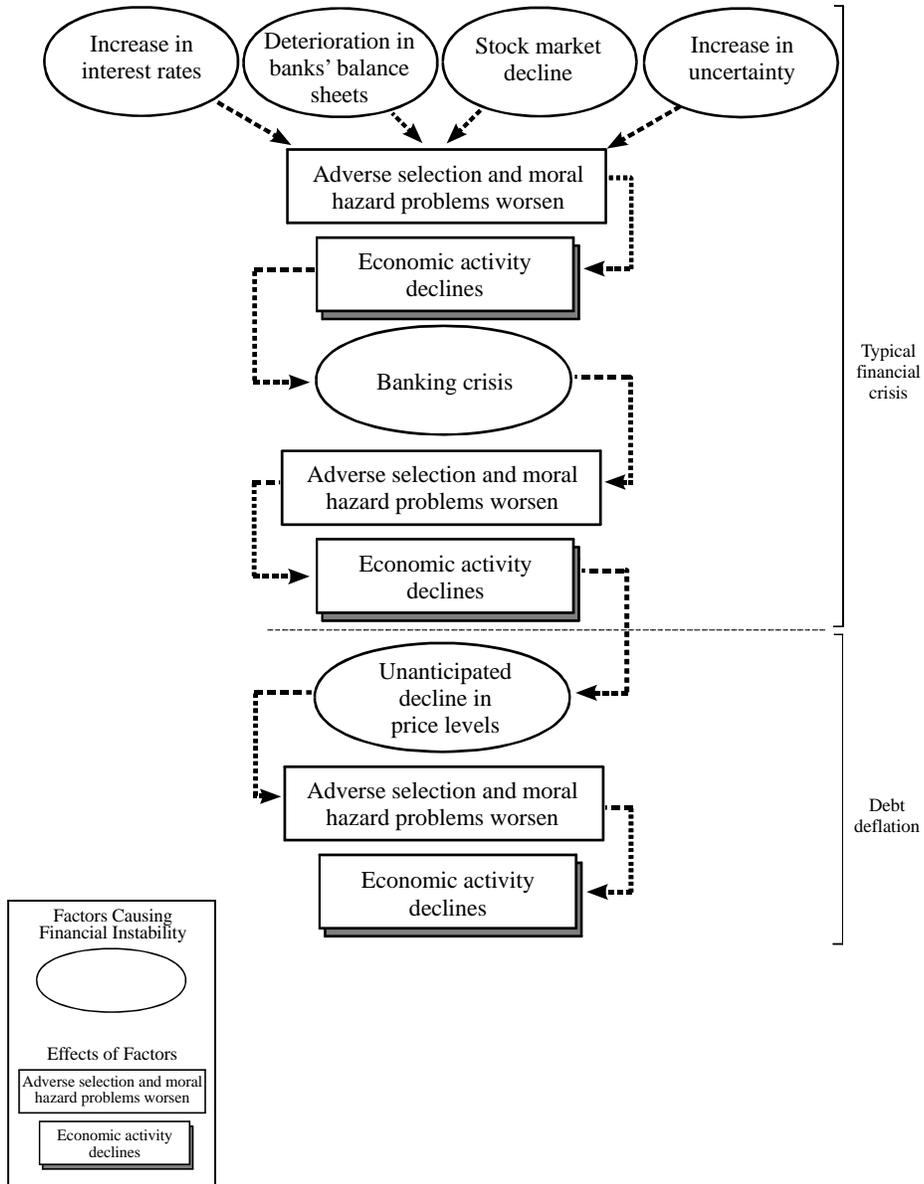
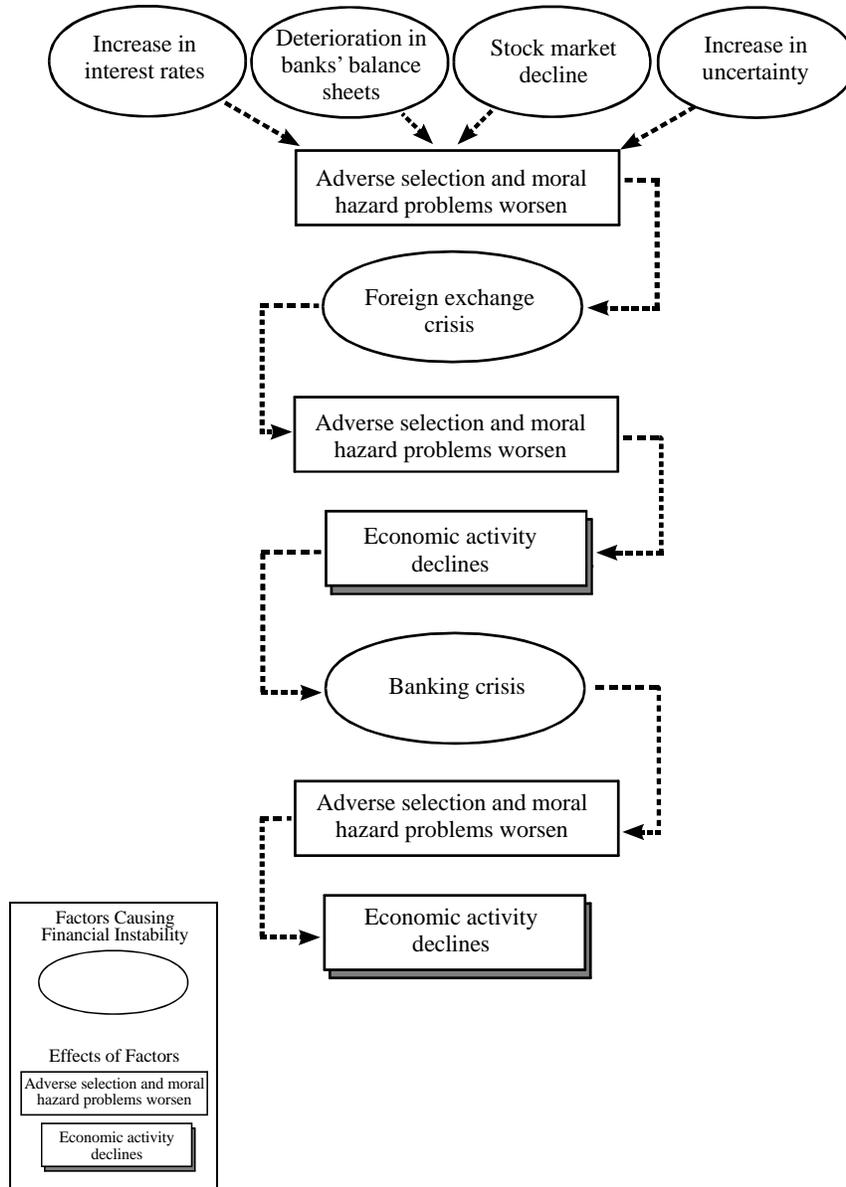


Figure 2
Propagation of Financial Instability
in Emerging-Market Countries



the financial instability that country has been experiencing in the 1990s is a similar one. Liberalization of the financial sector and an increased competitive environment for banks led to accumulating loan losses, while a further blow was dealt to bank balance sheets when the stock market decline reduced the banks' hidden reserves. The deterioration in bank balance sheets decreased the ability of the banks to lend because efforts to improve their capital ratios required retrenchment on lending.

Stock market crashes are also typically associated with financial instability. The precipitous decline in stock prices in both Mexico and Japan in recent years has been a precipitating factor in each country's financial instability. The declining net worth of nonfinancial firms then increased adverse selection and moral hazard problems in financial markets because the effective collateral in the firms had decreased, while the decline in net worth meant that the incentives for borrowers to take on risk at the expense of the lender had increased.

The fourth factor that frequently appears when there is financial instability is an increase in uncertainty, whether because an economy is already in recession, or because a major financial or nonfinancial firm goes bankrupt, or because of increased political instability. Financial crises in the United States in the nineteenth and early twentieth centuries came to a head with collapses of now infamous firms such as the Ohio Life Insurance & Trust Co. in 1857, the Northern Pacific Railroad and Jay Cooke & Co. in 1873, Grant & Ward in 1884, the National Cordage Co. in 1893, the Knickerbocker Trust Company in 1907, and the Bank of United States in 1930. In the case of the recent episode in Mexico, the increase in uncertainty was primarily political. The Mexican economy was hit by political shocks in 1994, specifically the Colosio assassination and the uprising in Chiapas, which increased general uncertainty in Mexican financial markets. Increases in uncertainty make it harder for financial markets to process information, thereby increasing adverse selection and moral hazard problems and causing a decline in lending and economic activity.

If any of the four factors in the top row of the two figures occurs, it can promote financial instability. If all of these factors occur at the same time and are large, the situation is likely to escalate into a full-scale financial crisis, with much greater negative effects on the real economy.

As shown in Figure 2, in emerging-market countries, deterioration of banks' balance sheets, increases in foreign interest rates, and political uncertainty can help produce a foreign exchange crisis in which a substantial devaluation (depreciation) of the domestic currency occurs. Particularly important (and not sufficiently appreciated) in promoting a foreign exchange crisis is a deterioration in bank balance sheets that can make it extremely difficult for the central bank to defend the domestic currency. Any rise in interest rates to keep the domestic currency from depreciating has the additional effect of weakening the banking system further because the rise in interest rates hurts banks' balance sheets. This negative effect of a rise in interest rates on banks' balance sheets occurs because of their maturity mismatch and their exposure to increased credit risk when the economy deteriorates. Thus, when a speculative attack on the currency occurs in an emerging-market country, the central bank is caught between a rock and a hard place. If it raises interest rates sufficiently to defend the currency, the banking system may collapse. Once investors recognize that a country's weak banking system makes it less likely that the central bank will take the steps to successfully defend the domestic currency, they have even greater incentives to attack the currency because expected profits from selling the currency have now risen. The situation described here is exactly the one that occurred in Mexico in 1994, and the weakness of the banking system there played a prominent role in the ensuing collapse of the currency.

The institutional features in emerging-market countries—the short duration of debt, the large amount of debt denominated in foreign currency, and the lack of inflation-fighting credibility—can interact with a foreign exchange crisis to propel the economy into a full-fledged financial crisis, as shown in Figure 2. A sharp decline in the value of the domestic currency can lead to a dramatic rise in

both actual and expected inflation because of direct effects and because it weakens the credibility of the monetary authorities to keep inflation under control. This rise in actual and expected inflation combined with attempts by the central bank to keep the value of the currency from falling further, means that interest rates can go to sky-high levels. In the aftermath of the Mexican December 1994 devaluation, for example, domestic short-term interest rates in Mexico rose to above 100 percent at an annual rate. The interaction of the rise in interest rates with the short duration of debt then leads to a huge increase in interest payments, with a dramatic deterioration in households' and firms' cash flow. In addition, because many firms have their debt denominated in foreign currency, the depreciation of the domestic currency leads to an immediate, sharp increase in their indebtedness in domestic currency terms, while the value of their assets remains unchanged. The result of the negative shock to net worth is another severe blow to firms' balance sheets, causing a dramatic increase in adverse selection and moral hazard problems, with the negative effects on lending and economic activity shown in Figure 2.

In contrast to the situation in emerging-market countries, the mechanism propagating financial instability through the foreign exchange market is not operational for most industrialized countries. Because inflation is expected to be kept under control, a devaluation does not lead to large increases in expected inflation and hence in nominal interest rates. Furthermore, to the extent that interest rates rise, the impact on cash flow and balance sheets is not nearly as strong because debt has much longer duration. Furthermore, with almost all debt denominated in the domestic currency, a devaluation has little direct impact on firms' balance sheets. Indeed, in contrast to the situation for many emerging-market countries, an industrialized country that experiences a devaluation after a foreign exchange crisis often gets a boost to the economy because its goods become more competitive. This explains why an industrialized country like the United Kingdom experienced a stronger economy after the September 1992 foreign exchange crisis, while an emerging-market country like Mexico experienced a depression after its foreign exchange crisis in December 1994.

The next stage in the propagation of financial instability in both industrialized and emerging-market countries is often a worsening banking crisis (Figures 1 and 2). The problems of households and firms because of the decline in economic activity and deterioration in their cash flow and balance sheets mean that they now have trouble paying off their debts, resulting in substantial losses for banks. In addition, a foreign exchange crisis in an emerging-market country produces a direct negative impact on bank balance sheets. As described earlier, the resulting currency devaluation leads to a substantial rise in the domestic currency value of foreign-denominated liabilities, but the often matching foreign-denominated assets typically do not rise in value because the likelihood of these loans being paid off in full becomes quite low in the face of worsening business conditions and the negative effect of the devaluation on the borrowers' balance sheets. Also problematic for banks in emerging-market countries is that many of their foreign currency-denominated debt is very short term, so that the sharp increase in the value of this debt leads to liquidity problems for the banks because this debt needs to be paid back.

If the government safety net is inadequate, the problems outlined above lead to a collapse of the banking system, but in other cases the government is able to step in to protect depositors, thereby avoiding a banking panic. Whether the banks disappear or whether they remain afloat but with a substantially weakened capital base, the ability of banks to lend decreases significantly. As we have seen, the resulting banking crisis that decreases bank lending makes adverse selection and moral hazard problems worse in financial markets because banks are no longer as capable of playing their traditional financial intermediation role. Furthermore, if a banking panic does ensue, depositors withdraw their funds from the banking system in order to limit their losses. Through the usual money-multiplier story, the outcome is a decline in the money supply, which raises interest rates even further. The result of banking crises in industrialized and emerging-market countries is thus a severe decline in economic activity as shown in both Figures 1 and 2.

The aftermath of a financial crisis is often a sorting out of insolvent

firms from healthy firms by bankruptcy proceedings, and the same process would occur for banks, often with the help of public and private authorities. Once this sorting out is complete, uncertainty in financial markets declines, the stock market undergoes a recovery, and interest rates fall. The outcome would be a diminution in adverse selection and moral hazard problems and the financial crisis would subside. With the financial markets beginning to operate reasonably well again, the stage would be set for the recovery of the economy.

However, in industrialized countries, with their long-duration debt contracts, financial instability might propagate further through the process which was dubbed “debt deflation” by Irving Fisher (1933). As shown in Figure 1, the economic downturn and contraction of the money supply resulting from a bank panic might lead to a sharp decline in prices. With the unanticipated deflation, the recovery process might get short-circuited. In this situation described by Irving Fisher (1933) as a debt-deflation, the unanticipated deflation would lead to a further deterioration in firms’ net worth because of the increased burden of indebtedness. As we have seen, when debt-deflation sets in, the adverse selection and moral hazard problems continued to increase. As a result, investment spending and aggregate economic activity might remain depressed for a long time. Indeed, debt deflations were very common in the United States in the nineteenth and early twentieth centuries and were associated with among the most severe economic contractions in U.S. history in 1873, 1907, and 1930-33. Similarly, the deflation that Japan experienced in recent years prolonged its economic malaise by hindering the recovery of banks’ and firms’ balance sheets.

The theory of the propagation of financial instability outlined here provides a cohesive story not only behind the sequence of events in financial crises in industrialized countries, such as the United States in the nineteenth and early twentieth centuries or Japan in the 1990s, but also for emerging-market countries such as Mexico in 1994-95 or Chile in 1982.¹³ It shows how countries can shift dramatically from growth to a sharp contraction in economic activity after a financial crisis occurs. The bottom line is that the propagation of financial instability that becomes severe enough to produce a financial

crisis leads to such a worsening of information flows in financial markets that it produces a collapse of lending and economic activity.

Lessons for policymakers

The asymmetric information analysis of the causes and propagation of financial instability outlined in this paper is not just theoretically interesting but has many important lessons for policymakers. Indeed, this analysis has implications for how the bank regulatory/supervisory process should be structured, how financial liberalization should proceed, which exchange rate regime should be chosen, how the lender-of-last-resort role should be conducted, and how policymakers should take account of the interaction of price stability with financial stability.

Bank regulation and supervision

As we have seen, banks play a particularly important role in the financial systems of both industrialized and particularly emerging-market countries' financial systems, and thus problems in the banking sector are a particularly important source of financial instability. Indeed, we have seen that deterioration in banks' balance sheets are an important precursor of financial crises, especially in emerging-market countries. There, problems in the banking sector can make a foreign exchange crisis more likely, which in turn leads to a full-blown financial crisis. Our asymmetric information framework suggests that there is an important need for a government safety net for the banking system—the key feature of which is *not* deposit insurance—in order to prevent bank panics. Although a safety net is important, it nonetheless increases the moral hazard incentives for excessive risk taking on the part of the banks. All countries therefore need to pay particular attention to creating and sustaining a strong bank regulatory/supervisory system to reduce excessive risk taking in their financial systems.

Encouraging a strong bank regulatory/supervisory system takes several forms. First, bank regulatory/supervisory agencies need to be provided with adequate resources to do their job effectively.

Without these resources, the bank supervisory agency will not be able to monitor banks sufficiently in order to keep them from engaging in inappropriately risky activities, to have the appropriate management expertise and controls to manage risk, or to have sufficient capital so that moral hazard incentives to take on excessive risk are kept in check. Indeed, this inability to monitor banks sufficiently has occurred in both industrialized countries (for example, the savings and loan crisis in the United States) and in many emerging-market countries (Mexico being just one recent example).

Second, accounting and disclosure requirements for financial institutions, which are often particularly lacking in emerging-market countries but in a number of industrialized countries as well, need to be beefed up considerably. Without the appropriate information, both markets and bank supervisors will not be able to adequately monitor the banks to deter excessive risk taking.¹⁴ Proper accounting standards and disclosure requirements are therefore crucial to a healthy banking system.

Third, prompt corrective action by bank supervisors will stop undesirable bank activities and, even more importantly, not only close down institutions that do not have sufficient net worth, but also make sure that stockholders and managers of insolvent institutions are appropriately punished. Prompt corrective action is particularly important in part because it immediately prevents banks from “betting the bank” in order to restore the value of the institution, and in part because it creates incentives for banks not to take on too much risk in the first place, knowing that if they do so, they are more likely to be punished.

Fourth, because prompt corrective action is so important, the bank regulatory/supervisory agency needs sufficient independence from the political process in order that it is not encouraged to sweep problems under the rug and engage in regulatory forbearance. One way to ensure against regulatory forbearance is to give the bank supervisory role to a politically independent central bank. This has desirable elements as pointed out in Mishkin (1991), but some central banks might not want to have the supervisory task thrust

upon them because they worry that it might increase the likelihood that the central bank would be politicized, thereby impinging on the independence of the central bank. Alternatively, bank supervisory activities could be housed in a bank regulatory authority that is independent of the government.

Fifth, it is important to make bank supervisors accountable if they engage in regulatory forbearance in order to improve incentives for them to do their job properly. For example, as pointed out in Mishkin (1997), an important but very often overlooked part of the 1991 Federal Deposit Insurance Corporation Improvement Act (FDICIA) in the United States, which has helped make this legislation effective, is that there is a mandatory report that the supervisory agencies must produce if the bank failure imposes costs on the Federal Deposit Insurance Corporation (FDIC). The resulting report is made available to any member of Congress and to the general public upon request, and the General Accounting Office must do an annual review of these reports. Opening up the actions of bank supervisors to public scrutiny makes regulatory forbearance less attractive to them, thereby reducing the principal-agent problem. In addition, subjecting the actions of bank supervisors to public scrutiny reduces the incentives of politicians to lean on supervisors to relax their supervision of banks.

Financial liberalization

Deregulation and liberalization of the financial system have swept through almost all countries in recent years. Although deregulation and liberalization are highly desirable objectives, the asymmetric information framework in this paper indicates that if this process is not managed properly, it can be disastrous. If the proper bank regulatory/supervisory structure is not in place when liberalization comes, the appropriate constraints on risk-taking behavior will be nonexistent. The result will be that bad loans are likely, with potentially disastrous consequences for bank balance sheets at some point in the future. In addition, before liberalization occurs, banks may not have the expertise to make loans wisely, and so opening them up to new lending opportunities may also lead to poor quality of the

loan portfolio. We have also seen that financial deregulation and liberalization also often lead to a lending boom, because of both increased opportunities for bank lending and financial deepening in which more funds flow into the banking system. Although financial deepening is a positive development for the economy in the long run, in the short run the lending boom may outstrip the available information resources in the financial system, helping to promote a financial collapse in the future.

The dangers in financial deregulation and liberalization do not mean that countries should not pursue a liberalization strategy. To the contrary, financial liberalization is critical to the efficient functioning of financial markets so that they can channel funds to those with the most productive investment opportunities. Getting funds to those with the most productive investment opportunities is especially critical to emerging-market countries because these investments can have especially high returns, thereby stimulating rapid economic growth. Financial deregulation and liberalization thus need to be actively pursued, but have to be managed carefully. It is important that policymakers put in place the proper bank regulatory/supervisory institutional structure before liberalizing their financial systems. This means following the precepts outlined above: providing sufficient resources to bank supervisors, adopting adequate accounting and disclosure requirements, encouraging bank supervisors to take prompt corrective action, and insulating bank supervision from the political process. Furthermore, policymakers may need to pursue financial liberalization at a measured pace in order to keep a lending boom from getting out of hand which, in turn, stresses the capabilities of both bank management and bank supervisors. Even though eating is essential to human health, eating too fast can lead to an upset stomach. A similar lesson applies to the process of financial deregulation and liberalization.

The asymmetric information framework for analyzing financial instability also illustrates that institutional features of the financial system besides bank regulation can be critical to how prone countries are to financial instability and to the severity of the effects on the economy if a financial crisis occurs. The legal and judicial

systems are very important for promoting the efficient functioning of the financial system and the inadequacies of legal systems can be a serious problem for financial markets. If property rights are unclear or hard to enforce, the process of financial intermediation can be severely hampered. For example, we have seen that collateral can be an effective mechanism to reduce adverse selection and moral hazard problems in credit markets because it reduces the lender's losses in the case of a default. However, in many countries, the legal system makes attaching collateral a costly and time-consuming process, thereby reducing the effectiveness of collateral to solve asymmetric information problems. Similarly, bankruptcy procedures in many countries are often very cumbersome, resulting in lengthy delays in resolving conflicting claims. Resolution of bankruptcies in which the books of insolvent firms are opened up and assets are redistributed can be viewed as a process to decrease asymmetric information in the marketplace, and as we have seen in the discussion of how financial crises end, is an important part of the recovery process from a financial crisis. Slow resolution of bankruptcies can therefore delay recovery from a financial crisis because only when bankruptcies have been resolved is there enough information in the financial system to restore it to a healthy operation.

Choice of exchange rate regimes

One commonly used method to reduce inflation and keep it low is for a country to peg the value of its currency to that of a large, low-inflation country. In some cases, this strategy involves pegging the exchange rate at a fixed value to that of the other country's currency so that its inflation rate will eventually gravitate to that of the other country. In other cases, the strategy involves a crawling peg or target in which one country's currency is allowed to depreciate at a steady rate against that of another country so that its inflation rate can be higher than that of the country to which it is pegged.

Although adhering to a fixed or pegged exchange rate regime can be a successful strategy for controlling inflation, the asymmetric information analysis in this paper illustrates how dangerous this

strategy can be for an emerging-market country. This strategy is particularly dangerous if the emerging-market country has a fragile banking system, short-duration debt contracts, and substantial amounts of debt denominated in foreign currencies. With a pegged exchange rate regime, depreciation of the domestic currency when it occurs is a highly nonlinear event because it involves a devaluation. Because of the institutional features of debt markets in emerging-market countries, the devaluation, if it is large enough, can precipitate a full-scale financial crisis in which financial markets are no longer able to move funds to those with productive investment opportunities, thereby causing a severe economic contraction. The devaluation that results in a rise in indebtedness leads to a sharp deterioration in firms' and banks' balance sheets. In addition, we have seen that a devaluation, particularly if it occurs in a crisis atmosphere, can reduce confidence in the ability of the central bank to keep inflation under control in emerging-market countries and result in a dramatic increase in interest rates that hurts firms' cash flow and increases financial instability. Thus, a sufficiently large devaluation can tip the emerging-market country into a full-scale financial crisis, with devastating effects on the economy. Therefore, a pegged exchange rate regime with the institutional features outlined above is like putting the economy on a knife edge. One slip and the economy comes crashing down. As with Humpty Dumpty, it is very hard to quickly put the economy back together again.

The analysis in this paper does not indicate that fixing or pegging an exchange rate should never be used to control inflation. Indeed, countries with a past history of poor inflation performance may find that only with a very strong commitment mechanism to an exchange rate peg (as in a currency board) can inflation be controlled. However, the analysis does suggest that countries using this strategy to control inflation must actively pursue policies that will promote a healthy banking system. Furthermore, if a country has an institutional structure of a fragile banking system, short-duration debt contracts and substantial debt denominated in foreign currencies, using an exchange rate peg to control inflation can be a very dangerous strategy indeed.¹⁵

A flexible exchange rate regime has the advantage that movements in the exchange rate are much less nonlinear than in a pegged exchange rate regime. Indeed, the daily fluctuations in the exchange rate in a flexible exchange rate regime have the advantage of making clear to private firms, banks, and governments that there is substantial risk involved in issuing liabilities denominated in foreign currencies. Furthermore, a depreciation of the exchange rate may provide an early warning signal to policymakers that their policies may have to be adjusted in order to limit the potential for a financial crisis.

The lender-of-last-resort role

We have seen that a government safety net can prevent banking panics by eliminating losses to depositors, thus relieving them of the need to run on the bank if they are unable to verify that the bank is healthy. One way to avoid a run or prevent a banking panic is to provide deposit insurance that insures deposits at all banks. The problem with deposit insurance is that it not only props up banks that are facing systemic risk, but also insulates depositors if the risk is completely idiosyncratic to that bank. Thus, although deposit insurance prevents banking panics if the insurance fund has suitable financial backing, it eliminates market discipline, even if there is little potential systemic risk on the horizon.

An alternative method for providing a safety net is for the central bank to stand ready to act as a lender of last resort. The traditional recommendation for prevention of financial crises goes back to Thornton (1802) and Bagehot (1873) who recommend that the central bank be a lender of last resort that will lend freely during a panic at a penalty rate. What does the asymmetric information framework outlined here say about this traditional recommendation? Does it provide further guidance on when the central bank needs to be ready to be a lender of last resort and how it can conduct this role?

Some economists, particularly of the monetarist persuasion, view financial instability very narrowly and worry about it only if it might produce banking panics that lead to a decline in the money supply.

With this view, the lender-of-last-resort role should be a narrow one: the central bank would only lend freely to banks when there is a sudden desire on the part of depositors to withdraw their funds from banks. To lend freely at other times, during what Anna Schwartz (1986) calls “pseudo-financial crises,” will only lead to inefficiency because firms that deserve to fail are bailed out, or because the central bank lending results in excessive money growth that stimulates inflation. Indeed, this position suggests that if the central bank is able to keep monetary aggregates growing at appropriate rates, a lender-of-last-resort role is even needed to promote the health of the economy.

Although it sees an important role for bank panics, an asymmetric information view of financial instability does not see bank panics as the only financial disturbances that can have serious adverse effects on the aggregate economy. Financial instability can have negative effects over and above those resulting from banking panics, and analysis of such episodes as the Penn Central bankruptcy in 1970 and the stock market crash in October 1987 suggest that a financial crisis that has serious adverse consequences for the economy can develop even if there is no threat to the banking system (Mishkin 1991).

The asymmetric information analysis thus suggests that a lender-of-last-resort role may be necessary to provide liquidity to nonbanking sectors of the financial system in which asymmetric information problems have developed. Furthermore, this analysis suggests that financial disturbances outside the banking system in the postwar period have had the potential to have serious adverse effects on the aggregate economy. However, the analysis also provides support for the monetarist position that in order to prevent severe disturbances to the economy, it is important for the central bank to operate as the lender of last resort to prevent banking panics.

Although a central bank’s role as a lender of last resort has the benefit of preventing financial crises, it does have a cost. If a bank’s depositors expect that the central bank will provide a bank with discount loans when it gets into trouble and come to its rescue, then they have less incentive to monitor the bank and withdraw their

deposits if the bank takes on too much risk. Thus, the lender-of-last-resort role in itself can produce a moral hazard problem because it can lead to expectations that encourage banks to take on too much risk. This moral hazard problem is most severe for large banks if they are the beneficiaries of a somewhat misnamed “too big to fail” policy in which depositors at a large bank in trouble are protected from any losses by a lender-of-last-resort policy, such as that used when Continental Illinois failed in 1984 in the United States. (The “too big to fail” policy is somewhat misnamed because, although depositors are completely protected from losses, the bank is in fact allowed to fail with losses to the equity holders.) Evidence in Boyd and Gertler (1993) suggests that the cost of the “too big to fail” policy has indeed been quite high in the United States after it was put into force with the failure of Continental Illinois in 1984.

Similarly, the lender-of-last-resort role to prevent a financial crisis arising outside of the banking sector may encourage other financial institutions and borrowers from them to take on too much risk. Knowing that the central bank will prevent a financial crisis if it appears imminent will encourage them to protect themselves less against systemic risks, that is, those that occur systemwide that will trigger a lender-of-last-resort response. There is thus a tradeoff between the moral hazard cost of the lender-of-last-resort role and the benefits of a lender-of-last-resort role in preventing financial crises.¹⁶

The asymmetric information view of financial crises thus does see a danger in too liberal a use of the lender-of-last-resort activities on the part of central banks. That there is a need to use the lender-of-last-resort role sparingly in order to keep moral hazard from getting out of hand argues against such intervention unless it is absolutely necessary. The lender-of-last-resort role should, therefore, occur very infrequently.

One problem in deciding whether to engage in the lender-of-last-resort role is to recognize that for it to be effective, it has to be implemented quickly. Less intervention is required the faster the lender-of-last-resort role is implemented because once market par-

ticipants know that liquidity is being injected into the system, uncertainty in the financial markets will decrease. Thus, the Federal Reserve's actions during the stock market crash of 1987 are a textbook case of how a lender-of-last-resort role can be performed successfully.¹⁷ The Fed's action was immediate, with an announcement that operated to decrease uncertainty in the marketplace. Reserves were injected into the system, but once the crisis was over, they were withdrawn. Not only was a financial crisis averted, but also the inflationary consequences of this exercise of the lender-of-last-resort role were quite small.

However, the need for the lender-of-last-resort action to be quick does mean that central banks may not be able to wait until all the information is in that tells them a financial crisis is about to occur or is occurring. To wait too long to implement a lender-of-last-resort policy could be disastrous. Thus, even though an asymmetric information framework provides some guidance as to when a lender-of-last-resort role should be implemented, deciding on when to do so will necessarily be an art rather than a science. Central bank "feel" for conditions in the financial markets that comes from informal as well as formal signals about developments in these markets is necessary to make the appropriate decision on when a lender-of-last-resort role is necessary.

Price stability

As a central banker, I cannot resist harping back to a central banker's favorite topic which I like to refer to as the "central banker's mantra." Central bankers in developed countries are often thought of as having a fixation on the goal of price stability. Several rationales have been posited for this goal, including the undesirable effects of uncertainty about the future price level on business decisions and hence on productivity, distortions associated with the interaction of nominal contracts and the tax system with inflation, and increased social conflict stemming from inflation. Not only do public opinion surveys indicate that the public is very hostile to inflation, but there is also mounting evidence from econometric studies that inflation is harmful to the economy.¹⁸

The asymmetric information analysis of financial instability in this paper provides additional reasons why price stability is so important. As was mentioned earlier, when countries have a past history of high inflation, debt contracts tend to have short durations and are often denominated in foreign currencies. These features of debt contracts lead to increased cash flow and liquidity problems for nonfinancial firms and banks when interest rates rise or when the domestic currency depreciates, thus increasing the fragility of the financial system. Price stability can thus help promote financial stability because it leads to longer duration debt contracts. In addition, achieving price stability is a necessary condition for having a sound currency. With a sound currency, it is far easier for banks, nonfinancial firms, and the government to raise capital with debt denominated in domestic currency. This also reduces financial fragility.

Furthermore, countries with highly variable inflation have a credibility problem that limits what policymakers can do to promote recovery from a financial crisis. Without credibility, a central bank in a developing country that tries to use expansionary monetary policy to enhance the recovery from a financial crisis may do more harm than good. Instead of shoring up weakened balance sheets, the expansionary policy is likely to lead to rapid rises in expected inflation and hence in interest rates, as well as to an exchange rate depreciation, all of which we have seen cause balance sheets to deteriorate further, thus making the financial crisis worse. Similarly, engaging in a lender-of-last-resort rescue might backfire because it may lead to worries about the central bank's commitment to low inflation. With a credible commitment to price stability, this vicious cycle will not occur. Expansionary monetary policy and the lender-of-last-resort role can be effectively used to shore up balance sheets and either nip a financial crisis in the bud or promote rapid recovery when a financial crisis occurs, as examples from U.S. history suggest.

It is often forgotten that a goal of price stability means not only that inflation should be kept low, but also that price deflations should be avoided. Our analysis has shown how price deflations in industrialized countries can be an important factor promoting financial instability and even lead to a prolonged financial crisis, as occurred

during the Great Depression in the United States or recently in Japan. Thus, the prevention of financial instability suggests why central banks must work very hard to prevent price deflations. The prevention of price deflations is as important an element of the price stability goal as prevention of inflation.¹⁹

However, just as with the worthy goal of financial liberalization, single-minded pursuit of price stability can be dangerous. A rapid disinflation process that leads to high real interest rates has adverse cash flow consequences for financial institutions such as banks. If the financial system is very fragile with already-weakened balance sheets, the disinflation could result in severe financial instability, resulting in depressing effects on the economy. Thus, before engaging in an anti-inflation stabilization program, policymakers need to pay particular attention to the health of their financial system, making sure that the regulatory/supervisory process has been effective in promoting strong balance sheets for financial institutions. Otherwise, financial institutions may not be able to safely weather the stresses stemming from an anti-inflation stabilization program. Successful monetary policy, therefore, requires successful regulation and prudential supervision of the financial system.

An important lesson of the analysis in this paper is that price stability and financial stability are mutually reinforcing goals. Central bankers and other policymakers need to always keep in mind that pursuing price stability requires the pursuit of financial stability and vice versa. Pursuing one goal without the other can, unfortunately, be highly disastrous.

Author's Note: I thank Steve Cecchetti, Dorothy Sobol, and participants at this symposium for their helpful comments. Any views expressed in this paper are those of the author only and not those of the National Bureau of Economic Research, Columbia University, the Federal Reserve Bank of New York, or the Federal Reserve System.

Endnotes

¹See Roubini and Sala-i-Martin (1995) and the references therein.

²Note that asymmetric information is not the only source of the moral hazard problem. Moral hazard can also occur because high enforcement costs might make it too costly for the lender to prevent moral hazard even when the lender is fully informed about the borrower's activities.

³Note that by making private loans, financial institutions cannot entirely eliminate the free-rider problem. Knowing that a financial institution has made a loan to a particular company reveals information to other parties that the company is more likely to be creditworthy and will be undergoing monitoring by the financial institution. Thus some of the benefits of information collection produced by the financial institution will accrue to others. The basic point here is that by making private loans, financial institutions have the advantage of reducing the free-rider problem, but they can not eliminate it entirely.

⁴Rojas-Suarez and Weisbrod (1994) document that banks play a more important role in the financial systems in emerging-market countries than they do in industrialized countries.

⁵As pointed out in Edwards and Mishkin (1995), the traditional financial intermediation role of banking has been in decline in both the United States and other industrialized countries because of improved information technology which makes it easier to issue securities. Although this suggests that the declining role of traditional banking, which has been occurring in the industrialized countries, may eventually occur in the developing countries as well, the barriers to information collection in developing countries are so great that the dominance of banks in these countries will continue for the foreseeable future.

⁶See Mankiw (1986).

⁷Additional recent surveys that discuss this monetary transmission channel are Hubbard (1995), Cecchetti (1995), and Mishkin (1996a).

⁸However, a decline in unanticipated inflation during periods when an anti-inflation program is in progress in developing countries has often been associated with very high real interest rates. Thus an unanticipated decline in inflation can negatively affect firms' balance sheets in developing countries through the cash flow mechanism discussed above.

⁹See Bernanke and Lown (1991), Berger and Udell (1994), Hancock, Laing, and Wilcox (1995), and Peek and Rosengren (1995), and the symposium proceedings published in the Federal Reserve Bank of New York *Quarterly Review* in the spring of 1993, Federal Reserve Bank of New York (1993).

¹⁰However, even in industrialized countries, the institutional structure of the banking system may prevent diversification, resulting in banks that are subject to terms-of-trade shocks. For example, because banks in Texas in the early 1980s did not diversify outside their region, they were devastated by the sharp decline in oil prices that occurred in 1986. Indeed, this terms-of-trade shock to the Texas economy, which was very concentrated in the energy sector, resulted in the failure of the largest banking institutions in that state.

¹¹An important point is that even if banks have a matched portfolio of foreign-currency denominated assets and liabilities and so appear to avoid foreign-exchange market risk, a

devaluation can nonetheless cause substantial harm to bank balance sheets. The reason is that when a devaluation occurs, the offsetting foreign-currency denominated assets are unlikely to be paid off in full because of the worsening business conditions and the negative effect that these increases in the value in domestic currency terms of these foreign-currency denominated loans have on the balance sheet of the borrowing firms. Another way of saying this is that when there is a devaluation, the mismatch between foreign-currency denominated assets and liabilities on borrowers' balance sheets can lead to defaults on their loans, thereby converting a market risk for borrowers to a credit risk for the banks that have made the foreign-currency denominated loans.

¹²Kane (1989) characterizes such behavior on the part of regulators as "bureaucratic gambling."

¹³See Mishkin (1991, 1996b) for a description of how this analysis explains the sequence and timing of financial crises in the United States in the nineteenth and early twentieth centuries and Mexico in 1994-95.

¹⁴The importance of disclosure is illustrated in a recent paper, Garber and Lall (1996), which suggests that off-balance-sheet and off-shore derivatives contracts played an important role in the Mexican crisis.

¹⁵See Obstfeld and Rogoff (1995) for additional arguments as to why pegged exchange rate regimes may be undesirable.

¹⁶Because in emerging-market countries central bank lending to the financial system to expand domestic credit in the wake of a financial crisis may arouse fears of inflation spinning out of control, the lender-of-last-resort role may be problematic in these countries (see Mishkin (1996b)). Central bank lending may cause a rise in interest rates and a depreciation of the exchange rate that lead to a deterioration in cash flow and balance sheets, thus hindering recovery of the economy.

¹⁷Indeed, this example appears in my textbook, Mishkin (1998).

¹⁸Inflation, particularly at high levels, is found to be negatively associated with growth. At lower levels, inflation is found to lower the level of economic activity, although not necessarily the growth rate. See the survey in Anderson and Gruen (1995) and Fischer (1993), one of the most cited papers in this literature.

¹⁹An interesting historical example of the value of preventing deflation is that of Sweden in the 1930s, which adopted a "norm of price stabilization" after leaving the gold standard in 1931. As a result, Sweden did not undergo the devastating deflation and financial instability experienced by other countries during the Great Depression (Jonung, 1979).

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