



Systemic Risk and the Macroeconomy: An Attempt at Perspective

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October 2, 2008

Indiana University, Bloomington, Ind.

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*I appreciate assistance and comments provided by my colleagues at the Federal Reserve Bank of St. Louis. Christopher Neely, assistant vice president, David Wheelock, assistant vice president, and Marcela M. Williams, special research assistant to the president, provided assistance. I take full responsibility for errors. The views expressed are mine and do not necessarily reflect official positions of the Federal Reserve System.

Good evening.(1) The financial turmoil in the U.S. has been going on for more than one year. The investment bank Bear Stearns collapsed in March, and over the summer the health of mortgage giants Fannie Mae and Freddie Mac was called into question. Financial markets have been on edge. Financial strains intensified two weeks ago with the bankruptcy of another investment bank, Lehman Brothers, and threatened bankruptcy of insurer American International Group.

In a short period of time, the landscape of Wall Street and the American financial system has changed radically. Financial market turmoil is widely considered to be the primary near-term threat to U.S. economic performance, and market commentary focuses on which financial institutions the government considers "too big" or "too connected" to fail.

Over the past year, several large global financial institutions have either failed or have been significantly restructured to avoid failure. But why should any firm, large or small, be protected from failure? After all, in a dynamic, competitive economy, individuals can raise capital, organize firms and enter markets. Obsolete firms, either because the demand for their products has declined or their management has not adapted to environmental change, must be allowed to fail. Why not apply this principle universally? For financial

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"Rationally, let it be said in a whisper, experience is certainly worth more than theory."
Amerigo Vespucci

firms, the answer usually focuses on *systemic risk*. Systemic risk refers to the possibility that the failure of one firm will severely impair or even cause the failure of other healthy firms or markets. If such contagion became widespread, it could severely affect the macroeconomy.

Systemic concerns were at the heart of many recent public policy decisions. For instance, regarding Bear Stearns, Chairman Bernanke recently explained: "Our analyses persuaded us . . . that allowing Bear Stearns to fail so abruptly at a time when the financial markets were already under considerable stress would likely have had extremely adverse implications for the financial system and for the broader economy. In particular, Bear Stearns' failure under those circumstances would have seriously disrupted certain key secured funding markets and derivatives markets and possibly would have led to runs on other financial firms."(2)

In my remarks this evening I will try to make sense of systemic risk. An important theme of systemic risk is its expectations component: In particular, if a firm is known to be at risk of failure for a substantial period of time, it cannot normally be thought to pose important systemic risk. Counterparties in such a case are well aware of the possibility of failure and can take action to mitigate their own risk. A second theme is that financial regulation should seek to ensure that no financial firm is "too big" or "too connected" to fail. The nation needs a regulatory regime that can liquidate in an orderly fashion non-bank financial firms that fail the market test. A third theme is that an overly aggressive public sector response to the potential failure of a financial institution can exacerbate systemic risks in the financial system by creating the expectation that taxpayers will pick up losses for failing firms. This is the well-known "moral hazard" problem.

Let me stress that I am presenting my personal views, which are not necessarily those of the Federal Open Market Committee or the Federal Reserve System.

What Is Systemic Risk?

Let me begin with a discussion of what is commonly meant by systemic risk and why failures of financial institutions sometimes are believed to be more likely to pose systemic risks than failures of nonfinancial institutions.

Systemic risk is difficult to define precisely. The leading practical definition seems to be that "we know it when we see it." In part because systemic risk is considered to be something of a rare event, it does not play a significant role in commonly used macroeconomic models. As a consequence, the discussion of systemic risk can be rather loose. Macroeconomists sometimes define systemic risk as the danger of widespread disruption of financial markets and institutions that, in turn, affects the

macroeconomy. For example, former Fed Gov. Frederic Mishkin defines systemic risk as "the risk of a sudden, usually unexpected, disruption of the information flows in financial markets that prevents them from channeling funds to those who have the most productive profit opportunities."⁽³⁾ A key part of this definition is the word "unexpected." Should a disruption cause financial markets to become badly damaged, all other parts of the economy may be adversely affected because the ensuing level of financial intermediation services may be considerably lower than they were before the disruption.

For example, consider a banking system. Traditionally, banks have held deposits with other banks to settle payments and exchange for services. Large money center banks often hold deposits for hundreds of other banks. The failure of a large money center bank thus could tie up the deposits of other banks, possibly causing large losses for them as well. Continental Illinois Bank was the largest correspondent bank in the United States when it failed in 1984. Regulators stepped in to protect Continental's creditors—even those with deposits exceeding the normal insurance limit—to guard against the possible failure of a large number of banks that held deposits at Continental.

Systemic risk is often associated with incomplete information. In the case of a banking system, systemic risk can arise when a bank's depositors—even relatively sophisticated depositors, such as other banks—become unsure about the condition of the bank in which they hold their funds. If Continental Illinois' depositors had realized that the bank was nearly insolvent, they would have protected their assets by moving their deposits to banks they considered sound. In fact, many large depositors did just that, suggesting that the systemic risk associated with Continental's failure was not very large. Indeed, one study concluded that few banks would have suffered significant losses even if the FDIC had not fully guaranteed all of the deposits in Continental.⁽⁴⁾

Recent concern about systemic risk has focused not so much on depositor runs on depository institutions, but rather on investment banks that deal in complex financial contracts. For example: Suppose Bank A purchases an option from Bank B to hedge some risk, perhaps the risk of a change in the term structure of interest rates. If Bank B later fails, perhaps because of bad investments in the housing market, then the option that Bank A purchased becomes worthless. Thus, Bank A—which thought it was carefully hedging its risk—is adversely affected by Bank B's problems in housing markets.

Of course, financial firms can take steps to protect themselves to some degree in simple situations like the one I just described. Inside the framework of an economic model, such steps would in fact fully compensate Bank A against the possible failure of Bank B. The logic of self-

interested behavior combined with market clearing would lead to an appropriate pricing of risk—Bank A would have considered the possibility of the failure of Bank B and taken this into account in its contingency plan. The possibility of counterparty failure would be fully priced into market transactions.

Economic models are abstractions, of course, but they do contain insight about the world. Is counterparty risk somehow mispriced in actual markets? It may be that, in actual markets, financial arrangements are so complex that the nature of risk that firms face might not be obvious. If so, that may be a challenge for those managing the risks. Nevertheless, as we saw with Bear Stearns and Lehman Brothers, sophisticated investors and counterparties will cease to do business with a firm once the firm's weak condition becomes known.

In recent years, concerns about bank runs have tended to center on individual institutions, rather than on the banking system as a whole. However, sometimes all firms in an industry are "tarred by the same brush" and the failure of one firm leads investors to shun an entire industry. Banking panics are the classic example: During the early 1930s, bank failures were so widespread that the public shifted a large portion of their funds out of bank deposits and into cash. Many economists believe that the Federal Reserve's unwillingness to counteract the resulting decline in the nation's money supply was an important cause of the Great Depression.

Why should the failure of a single firm cause the public to become suspicious of an entire industry? One answer is related to the fact that people have imperfect information, their own private noisy signal, and as a result they may try to infer information from the behavior of others. I'll give you a well-known example. Suppose you are driving down a highway and stop in a small town to eat. There are two restaurants on Main Street. Would you prefer to eat in the one with the crowded parking lot or the one whose parking lot is empty? Many people will infer that the restaurant with the crowded parking lot has better food and go there.

Many in this audience will know that a situation in which people infer information from the actions of others is called an "information cascade," and that it is an active field of research. Inferring others' information from their actions can be misleading, however. For example, suppose the first person to stop for lunch that day chose a restaurant arbitrarily. That uninformed choice might influence all the subsequent hungry people who attempt to determine a restaurant's quality from the number of cars parked in its lot.

As in the restaurant example, if depositors see others withdrawing money from a bank, they might infer that those making withdrawals have private information about the bank's condition. Similarly, if one bank fails, then

depositors—who are unable to independently distinguish good and bad banks—might decide that the problems that brought down the failed bank will also affect other banks. As a consequence, depositors might withdraw their money from all banks.⁽⁵⁾ The collapse of the asset-backed commercial paper market in 2007 appears to exemplify such herding behavior, because investors shunned the asset-backed commercial paper of all issuers more or less indiscriminately. Herding may explain why all firms in an industry are "tarred by the same brush" by investors, even if they are not necessarily tied to each other through explicit contractual obligations.

Why the Financial System Is Special

Nothing I have said thus far about systemic risk is necessarily unique to financial institutions or markets. Even the failure of a nonfinancial firm, such as an automobile manufacturer, will affect the firm's suppliers and distribution networks. Spillovers to the non-auto sector will also occur, but the regional effects might be larger than the national effects. By the same token, a default by an airline company on its debt obligations might cause investors to shun the debt of other airline companies if investors believed that the default reflected an industry-wide problem, such as rising fuel prices. Still, over the past decade, some very large firms have failed, including Enron, WorldCom and several major airlines, yet none caused significant problems beyond its immediate shareholders, employees, suppliers and customers. In fact, in recent years systemic risk has not been a public policy concern when a nonfinancial firm has failed. Rarely would the failure of a nonfinancial firm threaten the solvency of a competitor, let alone significantly affect the economy more broadly. Instead, failure of a large industry player often suggests opportunity for the remaining players to increase market share and profitability.

Why do we think the failure of a large financial firm presents risks that the failure of a nonfinancial firm does not? Several reasons have been emphasized.

The first is interconnectedness. In the normal course of business, large commercial and investment banks may become significantly exposed to one another through interbank deposit markets, transactions in over-the-counter derivatives, and wholesale payment and settlement systems. Settlement risk—the risk that one party to a financial transaction will default after the other party has delivered—is a big concern for large financial institutions whose daily exposures routinely run into many billions of dollars. The lightning speed with which financial transactions take place and the complex structures of many banks and securities firms make it especially difficult for a firm to fully monitor the counterparties it deals with, let alone the counterparties of counterparties. A seemingly strong bank that fails quickly may potentially expose other

firms to large losses. Even firms that do not make direct transactions with the affected bank may be exposed through their dealings with third parties that do trade with the affected bank.

A second reason is leverage. Compared with most nonfinancial firms, banks and other financial institutions are highly leveraged—that is, they have relatively thin capital margins to absorb losses. Firms acquire their assets either by selling equity or borrowing funds. If a financial firm has borrowed the equivalent of 95 percent of its assets, a 5 percent loss in asset value will render the firm insolvent. Fannie Mae and Freddie Mac, the giant government-sponsored enterprises that have financed or guaranteed nearly 50 percent of all U.S. home mortgages, ran into financial difficulties in part because of their extreme leverage. Fannie Mae and Freddie Mac were able to operate with very little capital because investors widely viewed their debt as guaranteed by the federal government. My predecessor, Bill Poole, warned several years ago that Fannie Mae and Freddie Mac held too little capital and were vulnerable to a downturn in the housing market.⁽⁶⁾ His comments were prescient: Both Fannie Mae and Freddie Mac have lost billions, prompting sharp declines in their share prices and ultimately a government conservatorship.

A third reason is maturity mismatch. Not only are financial institutions typically highly leveraged, but the nature of their business entails an inherent mismatch in the maturities of their assets and liabilities that can make them vulnerable to liquidity shocks. Most financial intermediaries borrow short and lend long—that is, they fund long-term, relatively illiquid investments with short-term debt. For example, commercial banks traditionally have used demand deposits, which depositors can withdraw at any time, to fund loans and other long-term investments. Similarly, many banks and securities firms rely heavily on commercial paper, repurchase agreements (repos) and other short-term funding sources. If depositors suddenly pull their funds from a commercial bank, or lenders cease to roll over the commercial paper or repos issued by a securities firm, the bank or securities firm could be forced into bankruptcy. Bear Stearns collapsed when investors refused to roll over the firm's short-term debt, collateral notwithstanding. Other firms have faced sharply higher funding costs as markets have reevaluated the creditworthiness of borrowers. The speed with which the markets can "turn off the tap" makes financial institutions especially vulnerable to temporary disruptions of liquidity in financial markets. A parallel was the "hot money" that was withdrawn from Thailand and other East Asian countries in the late 1990s—or Mexico prior to that.

Recent Developments in Financial Markets

During the past several years, a large number of financial institutions have built up considerable holdings of mortgage-backed securities and related financial instruments. These securities provided holders with a flow of income derived from the monthly mortgage payments of the underlying asset. The recent decline in house prices, along with a slowing economy, caused many homeowners to default or walk away from their homes—especially those with nontraditional mortgages. These conditions have eroded the value of the mortgage-backed securities and thus reduced the net wealth of those investors and institutions that held them.

The resulting illiquidity of mortgage-backed securities and related financial instruments has caused severe stress for the U.S. financial system over the past year. Many financial firms simply did not manage risk exposure on these securities well and, as a result, have struggled with losses and write-downs. A financial sector shakeout has ensued, one that was entirely appropriate considering the magnitude of the mismanagement involved. As is normal during an industry shakeout, weaker firms are forced into bankruptcy or merge with stronger partners, and opportunity abounds for those firms that are able to survive and build market share in the post-shakeout industry structure.

The Federal Reserve has responded vigorously in an attempt to mitigate the effects of the shakeout on the rest of the economy. The key concern has been that if important financial market players are failing, the failure should occur in an orderly way with the lowest level of market disruption. In the banking sector, there are well-established procedures for resolving a failed institution in an orderly way. It is very important to recognize that in the non-bank financial sector there are no such procedures. This has kept the Fed improvising, especially during the last seven months.

The Bear Stearns episode provided the first case of a large-scale failure. The novelty of the situation suggested that a Bear Stearns bankruptcy was largely unexpected within financial markets and therefore likely to cause significant market disruption. In that case, the Fed helped arrange a merger with JPMorgan Chase as the stock price of Bear Stearns was declining toward zero.

During the summer, mortgage giants Fannie Mae and Freddie Mac experienced increasing stress, eventually inducing an aggressive policy response. Placing these entities into conservatorship was largely a Treasury action in conjunction with the primary regulator, the Federal Housing Finance Agency (FHFA), with only a consultative role for the Federal Reserve. These government sponsored enterprises, or GSEs, were previously implicitly backed by the U.S. government, and the recent action makes that backing completely explicit. The GSE conservatorship

removes a key uncertainty from the scene and should help to stabilize markets going forward.

In recent weeks, the investment bank Lehman Brothers appeared to be in a position similar to Bear Stearns. The Lehman Brothers situation had been evolving for a year, and market players had already seen the demise of an investment bank. In this case, counterparties had plenty of time to assess the potential for Lehman to fail. As a consequence, financial market participants were less likely to have been surprised and significant market disruption was judged less probable. In addition, the Fed had implemented additional liquidity facilities in the wake of Bear Stearns in an attempt to mitigate adverse consequences from future failures. Lehman filed for bankruptcy. Since then, important pieces of the company have been sold to Barclays Capital. In a related development, investment bank Merrill Lynch agreed to sell itself to Bank of America. The two remaining investment banks, Goldman Sachs and Morgan Stanley, last week changed their charters to become commercial banks. These events have left the U.S. with no large investment banks.

One difficulty in dealing with a crisis is the element of surprise. Just as the events surrounding Lehman were coming to a head, solvency problems at insurer American International Group, with \$1.1 trillion in assets, became acute. While AIG's stock price had been declining for some time, its demise was rapid and largely unanticipated. A bankruptcy filing in the immediate aftermath of Lehman was judged likely to cause significant market disruption. The AIG board of directors agreed to a Fed bridge loan. The terms included the ouster of the CEO and an interest rate set at Libor plus 850 basis points.

It is important to stress that the Federal Reserve's intent in each of these cases has not been to save these firms but to orchestrate an orderly transition for financial markets as these firms exit the scene in their current form.

Again, because of the lack of a regime for the orderly resolution of failed institutions in the non-bank financial sector, the Fed was forced to improvise in the Bear Stearns, Lehman, and AIG episodes. These improvised actions have had mixed success. In the Bear Stearns episode, there was significant, but manageable, turmoil in the aftermath of the merger announcement. In the Lehman-AIG episode, there was significant turmoil that threatened to spread globally to seemingly unrelated markets. Part of this was attributable to the largely unexpected nature of the AIG bankruptcy threat within 48 hours of Lehman's bankruptcy filing. The continuing turmoil prompted Treasury Secretary Paulson to approach Congress concerning a more systematic method of handling the shakeout in the financial sector.

It is far from clear how financial market turmoil of this magnitude will ultimately affect the real economy. The leading modern example for large economies is Japan, where substantial problems in real estate and the banking sector were followed by a decade or more of sub par economic performance. Many Asian countries involved in the currency crises of 1997 and 1998 suffered through severe recessions. In the U.S., we have been more fortunate so far. The 1987 stock market crash has often been mentioned in conjunction with recent events, but real GDP growth was actually strong during the second half of 1987: Third quarter growth was 3.7 percent, and fourth quarter growth was 7.2 percent. At the time, many suggested that the U.S. was in or would immediately go into recession due to financial market upset. It did not happen, which provides an object lesson about how difficult it can be to really understand what is driving short-term dynamics in the economy. Similarly, the collapse of Long-Term Capital Management occurred in the second half of 1998, the culmination of a year of turmoil in global financial markets. But U.S. real GDP growth in the second half of 1998 averaged about 5.5 percent.

All of these events offer clues but also differ in important ways from the current episode. We do not know what will happen this time around, and we should be humble in our predictions. Still, these examples suggest that there is substantial downside risk. There is some possibility of a relatively benign outcome, where the financial market shakeout plays itself out and real economic performance is muted but not disastrous. But there is also some possibility of a very adverse outcome in which the entire economy is drawn into a protracted downturn.

Reducing Systemic Risk

What policies can reduce systemic risk in the financial system? Systemic risk may be viewed as a classic "public goods" problem, in which private firms invest less in the good than is socially desirable because they are unable to internalize all of the benefits of their investment. For this reason, private firms may invest less in minimizing systemic risks than would be socially desirable. In addition, it is likely to be difficult for private firms to coordinate their activities to minimize or eliminate systemic risks. Because of these problems, government policy can and should play a constructive role in reducing systemic risks in the financial system. Several proposed changes might reduce systemic risk in financial markets: enhanced supervision of financial firms; Federal Reserve oversight of payment and settlement systems; and the creation of a framework to liquidate investment banks and other securities firms in an orderly fashion, similar to the framework already in place to liquidate commercial banks.

Any change in regulation should be designed to ensure that no firm is "too big" or "too connected" to fail because of

systemic concerns. Bailouts are expensive—not just because they commit taxpayer funds, but because they can encourage behavior that increases subsequent systemic risk. A firm that expects government protection if its investments go awry may take bigger gambles than a firm that expects no protection. And if no securities firm were allowed to fail, then investors would have little incentive to monitor the activities of the firms in which they invest or to demand higher interest rates on loans to the riskiest firms. In short, the expectation of government intervention in the event of loss reduces market discipline and increases the incentive for firms to act imprudently.

Monetary policy plays an important role in the stability of our financial system. A monetary policy focused on preserving long-run price stability will, as a by-product, promote financial stability. By contrast, financial firms and markets are less resilient to shocks when the price level is unstable. An unstable price level can lead to poor price signals and cause inaccurate forecasts of real returns to investment projects. Errors in disentangling nominal and real returns can result in a misallocation of resources and eventually in financial distress that would not have occurred if the price level had been stable. Business decisions based on expectations of continuing inflation often turn out badly when inflation falls, resulting in higher rates of loan defaults and business failures. In short, inflation and inflation instability put an economy's financial sector at risk. Therefore, it is critical that monetary policymakers not lose sight of the importance of maintaining price stability—even during periods of financial turbulence.

Conclusion

In summary, the near-term outlook for economic growth and inflation is above all uncertain. Two keys to future economic performance will be stabilization in housing and financial markets. Financial market turmoil has recently been severe, and the consequences of this turmoil on real economic performance entail clear downside risk. If financial market turmoil can be contained, the FOMC can turn attention to achieving better inflation results than those recently experienced. Until inflation clearly moderates, my colleagues and I will need to be especially watchful that our accommodative policy stance does not begin to worsen the outlook for long-run price stability.

Footnotes

1. Portions of this speech were delivered as: "[Near-Term Challenges for the U.S. Economy](#)," in Murfreesboro, Tenn., on Sept. 26, 2008.
2. "Financial Regulation and Financial Stability." Remarks at the Federal Deposit Insurance Corp.'s Forum on Mortgage Lending for Low and Moderate Income Households, Arlington, Va., July 8, 2008.

3. "Systemic Risk and the International Lender of Last Resort." Remarks at the 10th Annual International Banking Conference, Federal Reserve Bank of Chicago, Chicago, Sept. 28, 2007.
4. Cited in George G. Kaufman and Kenneth E. Scott, "What is Systemic Risk, and Do Bank Regulators Retard or Contribute to It?" *The Independent Review*, Winter 2003, pp. 371-91.
5. For a classic discussion of banking panics, see Douglas Diamond and Philip Dybvig, "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy*, June 1983, pp. 401-19.
6. "Financial Stability." Remarks at the Southern Legislative Conference Annual Meeting, New Orleans, La., Aug. 4, 2002; "Housing in the Macroeconomy." Remarks at the Office of Federal Housing Enterprise Oversight Symposium, Washington, DC, March 10, 2003; "Reputation and the Non-Prime Mortgage Market." Remarks at the St. Louis Association of Real Estate Professionals, St. Louis, July 20, 2007.

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