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Introduction

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Concern over financial crises is nothing new. Indeed, the operation of financial markets and institutions has often been reshaped in the wake of financial crises or panics—for example, the founding of the Federal Reserve System following financial panics in the late nineteenth and early twentieth centuries, or the regulation of U.S. banking in the aftermath of widespread bank failures in the early 1930s. While public policy has been focused largely on regulation and financial market developments, (at least) two deeper questions remain.

First, what does one mean by “financial crisis”? The old adage that “you would know one when you see it” provides an insufficient framework for analysis beyond deduction from case studies. The papers in this volume reflect a different framework for thinking about financial crises as episodes of breakdowns in financial trade. “Financial trade” refers to the way in which financial contracts, institutions, and markets channel funds from ultimate savers to ultimate investors in the economy, allocate risk, and provide information about and incentives for borrowers’ performance. To the extent that actual episodes of panic or crisis are rare or unpredictable, economic research can focus discussion by analyzing why observed financial contracts, markets, and institutions exist. This microeconomic approach facilitates examination of the dynamic response of financial trade to economic disturbances.

Second, can or do financial crises affect the real economy in an important way? It is this query which has attracted the interest of macroeconomists. An emphasis on disruptions in financial trade has figured prominently in the examination of the economic effects of historical crises. Macroeconomic concerns extend to contemporary issues as well—for example, problems in financial institutions exposed to LDC debt and risky domestic corporate debt.

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Potential topics for analysis of these questions about financial crises as breakdowns in financial trade extend beyond the scope of any one collection of papers. In this volume, contributors address aspects of four themes:

1. ways in which problems in contracting in financial markets can magnify economic disturbances;
2. use of historical episodes of financial panics to discriminate among alternative hypotheses of the economic role of financial institutions;
3. constraints on public policy posed by (perceived or actual) fragility of financial markets or institutions; and
4. case studies of problems in one contemporary crisis, the sharp contraction of the U.S. savings and loan industry in the 1980s.

Financial Factors and Economic Activity

Microeconomic analyses of breakdowns in financial trade have relied on models of financial contracting under asymmetric information.¹ When borrowers have private information about their investment opportunities or about the way in which they allocate the funds contributed by outside investors, finance contracts not only allocate risk among investing parties but also serve to align the interests of insiders with those of suppliers of capital. In other words, financial arrangements will be structures to mitigate "agency costs." Movements in the stakes of insiders (internal finance) or in the availability of finance from outsiders specializing in information gathering and monitoring (e.g., banks) can have real effects—that is, on the level and variability of firms' investment, employment, or production.² To the extent that these movements are common across firms (owing, for example, to cyclical fluctuations in firms' internal funds or to "credit crunches"), magnification of effects of economic disturbances is possible.

Mark Gertler, Anil Kashyap, and I pursue one aspect of this line of thinking to obtain an indicator of financial trouble. We motivate a financial propagation mechanism by providing a rationale for why the agency costs of external finance may fluctuate countercyclically. Countercyclical movements in the wedge between the costs of external and internal finance in turn introduce a kind of "accelerator" effect, magnifying investment and output fluctuations. A key implication of these theories is that the spread between risky and safe interest rates should move inversely with investment and output. This implication is of particular interest, since recent work on postwar U.S. data has emphasized the role of interest rate differentials between risky and safe debt in forecasting real GNP (Stock and Watson 1989); increases in the spread are associated with subsequent downturns in GNP growth.

Gertler, Kashyap, and I stress an interpretation in which the widening of the spread is associated with increasing agency costs of external finance. In

addition to being compatible with the time-series evidence, the theory also provides a formal underpinning for studies of financial crisis which have emphasized sharp increases in the spread as precursors to financially induced disruptions in real activity. In our model, changes in the interest rate spread predict future movements in investment and output. We present an example using the Euler equation corresponding to firms' intertemporal decisions about investment. Situations are identified where, owing to agency problems, the basic Euler equation for investment is violated. Shifts in interest rate differentials help predict investment in these periods. We present corroborating evidence for U.S. producers' durable equipment investment over portions of the postwar period.

Returning to microeconomic models of financial contracts and financial crisis, one potential "leading indicator" of financial crisis is a sharp reduction in the net worth of borrowers in the economy. A clear example of such an adverse shock is a debt deflation. If debt contracts are written in nominal terms, then the real values of both the principal obligation and the debt-service burden rise in response to a general deflation in prices. The significant deflation of the late 1920s and early 1930s is a well-known case, with international transmission facilitated by countries' adherence to the gold standard.

While the connection between gold standard linkages and international deflation is intuitive, the link between deflation (a nominal disturbance) and depression (a protracted decline in real activity) is not. It is this connection which is explored in the paper by Ben Bernanke and Harold James. Bernanke and James review some channels suggested by previous research—movements in interest rates or real wages—but focus their attention on a breakdown in financial trade, the disruptive effect of deflation on the financial system. They consider two mechanisms: (i) debt-deflation shocks to firms' net worth and (ii) the failure of banks with nominal demandable liabilities and troubled loan assets. These mechanisms extend previous research by Bernanke (1983) and Bernanke and Gertler (1990) on links between the financial system and the real economy.

Bernanke and James analyze the connection between deflation and depression by exploiting cross-sectional variation across twenty-four countries during the interwar period. Their goal is to assess differences (e.g., in output growth) between countries experiencing banking crises and those that did not, or between countries remaining on the international gold standard and those that did not. For each country, they use historical studies to classify periods of financial crisis and find that periods of financial crisis have a significant role in explaining the connection between declining prices and declining output. That is, by exploiting cross-sectional variation in institutions or historical development, it can be shown that countries for which deflationary shocks precipitated financial panics had significantly worse declines in economic activity than countries in which the financial system was more stable. The authors argue that much of the residual impact of deflation on output growth (that part

not explained by financial crises) could be accounted for by debt-deflation effects on borrowers' net worth.³ The Bernanke-James paper provides a careful example of the effects of the efficiency of financial trade on economic growth.

Information Problems and the Origins of Financial Panics

Considering financial panics or crises as breakdowns in financial trade, one can attempt to classify such events methodically.⁴ Studying the behavior of financial markets during such periods is likely to be helpful in distinguishing among alternative economic explanations of events. Understanding the microeconomic foundations of observed disruptions in financial trade in turn provides guidance for analyses of central bank policy and regulation.

In his paper, Frederic S. Mishkin characterizes empirical regularities of historical financial crises in the United States. Going from the Panic of 1857 to the stock market crash of October 1987, he documents the breakdown in financial trading mechanisms in each episode. He finds that the onset of many panics follows the failure of a major financial institution; that panics are accompanied by rises in the spreads between risky and safe interest rates; and the most severe financial crises are associated with severe economic contractions.

Mishkin uses these regularities to distinguish between "monetarist" and "information" views of financial crises. The former view, associated most notably with Friedman and Schwartz (1963), stresses the importance of banking panics, since such episodes precipitate contractions in the supply of money and subsequent declines in economic activity. The alternative view stresses the microeconomic models of financial trade mentioned above. It emphasizes the importance of adverse selection and moral hazard problems during periods of unanticipated negative shocks to borrowers' net worth. The two views are actually complementary, as the "information" approach can provide a transmission mechanism for effects of declining money growth on economic activity during panics. Nonetheless, Mishkin argues that the information approach additionally contributes to our understanding of the dynamics of crises by accounting for timing patterns in the data which are otherwise difficult to explain.

Much of the concern to explain banking panics stems from the fact that their occurrence has been used to guide and rationalize government intervention in the banking industry. Empirical work has demonstrated the importance of institutional features (branch-banking regulation or arrangements for bank cooperation) for explaining the probability and resolution of bank panics. Charles W. Calomiris and Gary Gorton review recent theoretical and empirical work on the origins of banking panics. They stress that asymmetric information in financial markets amplifies effects of adverse economic news and problems of diversification of bank assets with unit banking in the United States.

Are banking panics the byproduct of random shocks to money demand under unit banking or the result of a combination of adverse news about bank assets and uncertainty about losses of unit banks because of asymmetric information? Recent theoretical work has focused on problems in bank liabilities and explains deposit-insurance contracts as being motivated by the problems of random-withdrawal shocks facing banks (from idiosyncratic liquidity requirements of depositors).⁵ Since banks hold illiquid loans, large unanticipated withdrawals could lead to failures. Calomiris and Gorton present evidence against a narrow interpretation of this view, using case studies of historical banking panics.

This line of inquiry is important. While the introduction of deposit insurance in the United States virtually eliminated the prospect of banking panics, it has not done so without cost, as the recent troubles of the savings and loan industry illustrate. Motivating bank panics using asymmetric information problems surrounding bank assets leads instead to more consideration of the role of a central bank as a "lender of last resort." The summary of the issues in the paper makes clear the need for additional theoretical and empirical research on the role of banks in the provision of credit.

Maintaining Financial Stability: Limits on Public Policy

That the mechanisms of financial trade (the organization of financial markets and institutions) are affected by public policy is clear. It may also be the case, however, that concern over the stability of financial institutions or markets constrains monetary policy. Three such possibilities are elaborated in this volume, addressing (i) U.S. monetary policy between World War II and 1951; (ii) the current "corporate debt crisis;" and (iii) the question of whether foreign investors will remain willing to accumulate U.S. liabilities.

Barry Eichengreen and Peter M. Garber analyze U.S. monetary and financial policy from World War II until the famous Treasury–Federal Reserve Accord of 1951. During this period, government interest rates were stabilized at 2.5 percent (or lower), despite swings in the annual inflation rate from 25 percent to –3 percent. These pronounced fluctuations in *ex post* real interest rates did not undermine the stability of financial institutions; indeed, there were only five bank suspensions between 1945 and 1951. The authors demonstrate that the juxtaposition of periods of rapid inflation and deflation with stable nominal interest rates is a corollary of the Federal Reserve's implicit policy of maintaining a target zone for the price level.

Eichengreen and Garber show how a credible price-level target-zone regime decoupled inflationary expectations and stabilized nominal interest rates. They also argue that the Federal Reserve adhered to this target-zone regime because of perceived threats to financial stability. In the aftermath of the Second World War, higher interest rates were thought to pose a threat to the stability of a U.S. commercial banking system heavily invested in U.S. govern-

ment bonds. Only when the banks' exposure to bond-market risk had been reduced was policy reoriented toward other targets.

Another set of policy concerns is related to the question of whether nonfinancial corporate leverage is "too high." Benjamin Friedman (1988) and others have raised the question of whether high leverage on the part of business firms may weaken the resolve of the Federal Reserve to fight inflation in the future, because of fears of large numbers of corporate bankruptcies. Aggregate data for the United States paint a clear picture for the 1980s of significant increases in net equity requirements and issuance of debt securities (see, e.g., Gertler and Hubbard 1990). This pattern is reflected in data for individual nonfinancial firms as well (Bemanke and Campbell 1988).

Mark J. Warshawsky extends the previous work of Bemanke and Campbell on micro data. While Bemanke and Campbell used data on a sample of firms followed by COMPUSTAT from 1969 through 1986, Warshawsky extends the sample through 1988, and expands it to include small corporations and corporations that have disappeared over the years owing to mergers, private buy-outs, and bankruptcy. He also reports an additional measure of financial stability—the median bond rating of issuing firms.

Warshawsky's findings strengthen many of the conclusions reached by Bemanke and Campbell. Current values of the ratio of interest expense to cash flow are at or near the highs reached in 1982 and 1988. Small corporations tend to have higher ratios, and hence weaker financial conditions, than large corporations. The median bond rating declined from about A in 1978 to BBB in 1988. He concludes that, judged by the criterion of simulated interest expense exceeding simulated cash flow, as much as 27 percent of corporations in the sample—corresponding to more than 6 percent of total corporate assets in the sample—would be placed in severe financial distress in a future recession. Finally, Warshawsky notes that recent costly defaults by large issuers of junk bonds cast doubt on the claim that contemporary debt contracts are sufficiently renegotiable to ward off financial distress or default in the wake of an adverse shock to firms' ability to service debt.

The past several years have witnessed mounting concern over the sensitivity of U.S. financial markets and institutions to disturbances abroad or to sharp unanticipated movements in the foreign exchange value of the dollar. Such concerns are typically expressed in one of two ways. First, in the U.S. external position sustainable? If not, what will be the likely process of financial adjustment? Second, what would be the effects of a sudden loss of confidence by foreign investors in the United States? Would there be a "financial crisis"?

The sustainability of the U.S. external position hinges of course, on the willingness of international investors to add U.S. liabilities to their portfolios. In their paper for the volume, Bankim Chadha and Steven Symansky argue that investors are not likely to allow a large buildup of such claims. They model the effects of foreign investors imposing a sustainable foreign asset ratio on the United States by positing the existence of a premium on dollar

assets when the foreign asset position is expected to deviate from this level. The process presents an example of a self-correcting mechanism for attaining external balance.

Chadha and Symansky try to obtain quantitative estimates using the MULTIMOD model of the International Monetary Fund. Simulations show that the premiums required may be modest for "correcting" potentially large movements in net foreign asset positions. However, the costs of such an imposed adjustment can be substantial in terms of lost output. Moreover, in the absence of a fiscal correction, this imposed external adjustment is likely to worsen the fiscal situation, thus increasing the costs of adjustment in terms of private consumption, investment, and future output.

Looking Ahead with the Savings and Loan Crisis: A Case Study

The collapse of large segments of the U.S. savings and loan industry during the 1980s has intermittently raised the specter of crisis. The debacle is certainly not over; many forecasts project the expenditure of hundreds of billions of dollars during the 1990s to make good on deposit-insurance liabilities incurred by failing institutions. Understanding the dynamics of the thrift crisis is important both for consideration of microeconomic models of institutional contractual design and for the evaluation of potential future troubles in the commercial banking industry.

At one level, the root of savings and loan problems is clear. Lacking an underlying economic rationale for the particular financial contracts they wrote (short-term deposits financing long-term fixed-rate mortgages), savings and loans were always vulnerable to interest rate risk. The combination in the early 1980s of financial deregulation and higher interest rates reduced, and in many cases eliminated, the economic net worth of the institutions. Since regulatory accounting conventions allowed low-net-worth institutions to continue operating, questions of excessive risk-taking owing to potential moral hazard problems arise. Other explanations for the extent of crisis include insufficient diversification on the part of thrifts and fraud. The three papers which constitute the savings and loan case study in this volume are prospective and address questions of whether thrifts remain vulnerable to interest rate risk; how derivative securities might be used to hedge interest rate risk; and the relative importance of such factors as "bad luck" and "excessive risk-taking" in explaining operating performance over time for a sample of thrifts.

The current deposit-insurance crisis in the savings industry is generally viewed as the result of sharply rising interest rates which effectively reduced to zero the net worth of thrifts funding fixed-rate loans with short-term deposits, and thrifts responding by taking even greater risks. Patric H. Hendershott and James D. Shilling ask how vulnerable thrift institutions remain to an interest-rate experience similar to that (over the 1977-86 period) which triggered the current crisis. They find that thrifts are even more vulnerable now

than they were in 1977. The dollar volume of mortgages funded by short-term deposits is greater now than it was then and thrifts have also put over \$325 billion of adjustable-rate loans with rate caps on their balance sheets. A sharp rise in interest rates (e.g., the one-year Treasury rate rose by 9 percentage points between 1977 and 1981) would cause significant losses on these loans, as well as on the fixed-rate loans. If thrifts were both well capitalized and profitable, their basic capital and earnings would be sufficient to cover such losses. However, Hendershott and Shilling estimate that, under the current conditions in the savings and loan industry, taxpayers would lose between \$50 billion and \$125 billion; this loss would be magnified, of course, if the institutions again assumed greater risk in their loan portfolio.

Savings and loan institutions can mitigate their exposure to interest rate risk by holding assets with flexible rates, in particular, adjustable-rate mortgages (ARMs). However, caps on ARMs still subject the originator to potentially severe interest-rate risk. Eduardo S. Schwartz and Walter N. Torous develop a two-factor model to value ARMs which takes into account their essential institutional features.⁶ The valuation model also incorporates borrowers' prepayment behavior by specifying their conditional probability of prepaying as a function of the mortgage's age and prevailing interest rate conditions. The authors use their framework to value lifetime and periodic cap options, as well as to compute the sensitivities of the caps to changes in the mortgage's features.

Schwartz and Torous present two ways for thrifts to deal with residual interest rate risk. First an ARM-originating thrift can use dynamic hedging techniques. These techniques allow the originator to minimize the resulting interest rate risk by taking offsetting positions in other interest-sensitive charges for such as bonds or bond futures. Second, the ARM originator can purchase "lifetime cap insurance." Schwartz and Torous derive the fair fee to charge for such insurance, that is, the premium in equilibrium that the originating thrift should pay to transfer the interest rate risk arising from the adjustable-rate mortgage's lifetime cap.

Assessing the role played by moral hazard factors—the effect of diminished net worth on risk-taking—in the savings and loan crisis is difficult. Calculations based on averages from aggregate data may be misleading. George J. Benston, Mike Carhill, and Brian Olasov analyze micro data on individual thrifts in their paper. They consider seven (not necessarily mutually exclusive) hypotheses that purport to explain why some savings and loan institutions failed and others survived during the 1980s. The authors use information drawn from 517 thrifts operating continuously from 1984 through 1988, and for 62 thrifts that ceased independent operations during this period. The data are derived from regulatory financial statements filed by institutions in the southeast (fourth) district. The authors develop an algorithm for calculating the market value of the institutions' assets, so as to facilitate an assessment of economic net worth (as opposed to accounting net worth under regulatory standards).

Interest rate increases in the early and middle 1980s rendered many thrifts economically insolvent—though they continued to operate under existing regulation—even with interest rates subsequently declining somewhat. At year-end 1984, the market values of continuously operating savings and loan institutions in the Benston-Carhill-Olasov sample were 72 percent lower on average than their recorded book values. In their tabulations of the data, the authors find some evidence of greater risk-taking by institutions with low net worth—that is, evidence of increases in portfolio riskiness and loan losses conditional on negative economic net worth.

Lessons

Financial contracts, markets, and institutions constitute important trading mechanisms in the operation of the real economy. Disruptions in the efficient operation of these mechanisms draw attention both to their organization and to potential adverse economic effects. Understanding microeconomic foundations of financial trade and its breakdowns will be important for studies of episodes of interest. Much work remains to be done in careful case studies and exploration of micro data to shed light on competing models of financial crises.

Notes

1. For reviews of theoretical and empirical research in this area, see Gertler (1988), Fazzari, Hubbard, and Petersen (1988), and Hubbard (1990).
2. See, for example, Fazzari, Hubbard, and Petersen (1988), Gertler and Hubbard (1988), and Hubbard and Kashyap (1990).
3. This is akin to the accelerator mechanism stressed by Gertler, Hubbard, and Kashyap (in this volume).
4. Such an approach has long been employed by economic historians. See, for example, the early work of Sprague (1910).
5. See, most notably, Diamond and Dybvig (1983) and the literature that followed.
6. The two factors are taken to be the instantaneous riskless rate of interest and the continuously compounded yield on a default-free consol bond.

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