WHAT IS SYSTEMIC RISK AND DO BANK REGULATORS RETARD OR CONTRIBUTE TO IT?

*George G. Kaufman and Kenneth E. Scott**

One of the most feared events in banking is the cry of systemic risk. It matches the fear of a cry of fire in a crowded theater or other gatherings. But unlike "fire," the term "systemic risk" is less clearly defined. Moreover, unlike fire fighters, who are rarely accused of sparking or spreading rather than extinguishing fires, bank regulators have at times been accused of, albeit unintentionally, contributing to rather than retarding systemic risk. This paper discusses the alternative definitions and sources of systemic risk, reviews briefly the historical evidence of systemic risk in banking, describes how financial markets have traditionally protected themselves from systemic risk, evaluates the regulations adopted by bank regulators to reduce both the probability of systemic risk and the damage caused by it if and when it may occur, and makes recommendations for efficiently curtailing systemic risk in banking.

I Systemic Risk

Systemic risk refers to the risk or probability of breakdowns in an entire system, as opposed to breakdowns in individual parts or components, and is evidenced by comovements (correlation) among most or all the parts. Thus, systemic risk in banking is evidenced by high correlation and clustering of bank failures in a country, a number of countries, or globally. Systemic risk may also

* Loyola University Chicago and Stanford Law School, respectively, Both authors are members of the U.S. Shadow Financial Regulatory Committee. Parts of the first section of the paper are derived from Kaufman 2000 a and b. The paper was presented at a conference following the Third Annual Joint Meeting of the European, Japanese, Latin American, and United States Shadow Financial Regulatory Committees in Amsterdam in June 2001. The authors are indebted to the participants at the conference and to Bill Bergman (Federal Reserve Bank of Chicago) and Edward Kane (Boston College) for helpful comments on earlier drafts.

occur in other parts of the financial sector - e.g., in securities markets as evidenced by simultaneous declines in the prices of a large number of securities in one or more markets in a country or across countries. Systemic risk may be either or both domestic and transnational.

A. Definitions of Systemic Risk in Banking

The precise meaning of systemic risk is ambiguous; it means different things to different people. A search of the literature reveals three frequent concepts. The first refers to a "big" or macro shock that produces near simultaneous large adverse effects for most or all of the domestic economy or system. That is, systemic "refers to an event having effects on the entire banking, financial, or economic system, rather than just one or a few institutions" (Bartholomew and Whalen, 1995, p. 4). Likewise, Mishkin (1995, p. 32) defines systemic risk as "the likelihood of a sudden, usually unexpected, event that disrupts information in financial markets, making them unable to effectively channel funds to those parties with the most productive investment opportunities." How the transmission of effects from a macro shock to individual units, or contagion, occurs or which units are affected or unaffected is generally unspecified. Allen and Gale (1998) model one process through which macroshocks can ignite bank runs

The two other definitions focus more on the micro level and the transmission of the shock and potential spillover from one unit to others. For example, Kaufman has defined systemic risk as the "probability that cumulative losses will accrue from an event that sets in motion a series of successive losses along a chain of institutions or markets comprising a system ... That is, systemic risk is the risk of a chain reaction of falling interconnected dominos" (Kaufman, 1995a, p. 47). This definition is consistent with that of the Federal Reserve that in the payments system

> systemic risk may occur if an institution participating on a private large-dollar payments network were unable or unwilling to settle its net debt position. If such a settlement failure occurred, the institution's creditors on the network might also be unable to settle their commitments. Serious repercussions could, as a result, spread to other participants in the private network, to

Likewise, the Bank for International Settlements (BIS) defines systemic risk as "the risk that the failure of a participant to meet its contractual obligations may in turn cause other participants to default with a chain reaction leading to broader financial difficulties" (BIS, 1994, p. 177). These definitions emphasizes causation as well as correlation, i.e., correlation with causation, and require close direct interconnections or linkages among institutions or markets. When the first domino falls, it falls on others causing them to fall and in turn knock down others in a chain or "knock-on" reaction along the interconnected units. Governor George of the Bank of England (1998) has described this effect as occurring "through the direct financial exposures which tie firms together like mountaineers, so that if one falls off the rock face others are pulled off too." For banks, this may occur if Bank A, for whatever reason, defaults on a loan, deposit, or other payment to Bank B that produces a loss greater than B's capital and forces it to default on payment to Bank C with losses that are larger than C's capital, and so on down the chain (Crockett, 1997). Banks, particularly within a country, tend to be closely interconnected through interbank deposits and loans. Note that, unlike in the first macro shock definition, in direct causation only one bank need be exposed to the initial shock. All other banks along the transmission chain may be exposure-free to this shock. The initial bank failure sets off the chain or knock-on reaction.

The smaller a bank' s capital-asset ratio -- the more leveraged it is -- the more is it likely both to be driven into insolvency by insolvencies of banks located earlier on the transmission chain and to transmit losses to banks located later on the chain. What makes direct causation systemic risk in financial sectors particularly frightening to many is both the lightning speed with which it is believed to occur and the belief that it can affect economically solvent (innocent) as well as

economically insolvent (guilty) parties, so that there is little or no way to protect against its damaging effects.

A third definition of systemic risk also focuses on spillover from an initial exogenous external shock, but does not involve direct causation and depends on weaker and more indirect interconnections. It emphasizes similarities in third party risk exposures among the units involved. When one unit experiences adverse effects from a shock, say the failure of a large financial or nonfinancial firm, that generates severe losses, uncertainty is created about the values of other units potentially also subject to adverse effects from the same shock. To minimize additional losses, market participants will examine other units, such as banks, in which they have economic interests to see whether and to what extent they are at risk. The more similar the risk exposure profile with that of the initial unit economically, politically, or otherwise, the greater is the probability of loss and the more likely are the participants to withdraw funds as soon as possible. The response may induce liquidity and even more fundamental solvency problems. This pattern may be referred to as a "common shock" or "reassessment shock" effect and represents correlation without direct causation (indirect causation).

Because information on either the causes or magnitude of the initial shock or on the risk exposures of each unit potentially at risk is not generally available immediately, accurately, or for free, and analysis of the information is not immediate or free, participants generally require time and resources to sort out the identities of the other units at risk and the magnitudes of any potential losses. Moreover, in banking, as credit markets deteriorate, the quality of private and public information available also deteriorates as the cost of accurate information increases and uncertainty increases further. Because many of the participants are risk averse and would rather be safe than sorry, they will quickly transfer funds, at least temporarily during the period of confusion and sorting out, to well recognized safe or at least safer units without waiting for the final analysis. In addition,

in periods of great uncertainty and stress, market participants increasingly tend to make their portfolio adjustments in quantities (runs) rather than in prices (interest rates).[1] That is, at least temporarily, they will not lend at any rate. Thus, there is likely to be an immediate flight or run to quality away from all units that appear potentially at risk, regardless of whether further and more complete analysis would identify them ex-post as having similar exposures that actually put them at risk of insolvency or not. At this stage, common shock contagion appears indiscriminate, potentially affecting more or less the entire universe and reflecting a general loss of confidence in all units. Solvent parties are not differentiated from insolvent. Because these runs are concurrent and widespread, such behavior by investors is often referred to as "herding" behavior.

The runs are likely to exert strong downward pressure on the prices (upward pressures on interest rates) of the securities of affected financially institutions and markets. Any resulting liquidity problems are likely to temporarily spill over to banks not directly affected by the initial shock. That is, the initial domino does not fall directly on other dominos, but its fall causes players to examine nearby dominos to see whether they are subject to the same destabilizing forces that caused the initial domino to fall. Broad contagion is likely to occur during such sorting-out or reassessment periods.

At some later date, after the sorting out process is complete, some or all of these flows affecting solvent banks may be corrected or reversed. Nevertheless, during the sorting out period, the fire-sale driven changes in both financial quantities (flows) and prices (interest rates) are likely to overshoot their ultimate equilibrium levels because of an uncertainty discount and intensify the liquidity problems, particularly for more vulnerable units (Kaminsky and Schmukler, 1999). However, the more frequent are banking crises, the more are market participants likely to become

[1] An interesting theoretical explanation of such investor behavior is developed in Herring and Wachter, 1999.

both better prepared and better informed, the shorter the sorting out and liquidity problem periods are likely to be, and the briefer will be the duration of any overshooting.

A distinction is often made between rational or information-based direct or indirect causation systemic risk and irrational, noninformation-based, random, or "pure" contagious systemic risk (Aharony and Swary, 1996, Kaufman, 1994 and Kaminsky and Reinhart, 1998). Rational or informed contagion assumes that investors (depositors) can differentiate among parties on the basis of their fundamentals. Random contagion, based on actions by uniformed agents, is viewed as more frightening and dangerous since it does not differentiate among parties, impacting solvent as well as insolvent parties, and is therefore likely to be both broader and more difficult to contain.[2] Thus, Governor George (1998) considers systemic risk as exceptionally costly because "the danger that a failure of one financial business may infect other, otherwise healthy, businesses." Direct, knock-on contagion is perceived as knocking over solvent as well as insolvent banks on the transmission chain. Common shock contagion systemic risk is likely to impact solvent banks immediately during the sorting out period, although in time investors and depositors will sort these out from the insolvent banks. Thus, the empirical borderline between rational and irrational contagion is fuzzy and in part depends on the time horizon applied. Likewise, the definition of "solvent" and "insolvent" is not always clear and precise. "Solvent" parties may be defined as units that are widely perceived to be economically well-behaved -- that is, banks that are perceived to be economically solvent and not overly leveraged. In contrast, "insolvent" banks are those perceived as economically insolvent or solvent but near insolvency or excessively leveraged.

B. Dangers of Systemic Risk

[2] For banks, runs on the entire banking system into currency because no bank is perceived safe leads to a decline in aggregate bank reserves and, unless offset by the central bank, a multiple contraction in aggregate money and credit. (See also Davis, 1995 and Diamond and Dybvig, 1983.)

Both the chain reaction and common shock concepts of systemic risk involve speedy contagion and require some actual or perceived direct or indirect interconnection among the parties at risk (Kaufman, 1994). Banks are interconnected directly through interbank deposits, loans, and payment system clearings and indirectly through serving the same or similar deposit or loan markets. In addition, to the extent that banks operate across national borders, they link the countries in which they operate. Thus, an adverse shock that generates sufficiently large losses at one bank to drive it into insolvency may transmit the shock to other banks along the transmission chain. Moreover, adverse shocks in the financial sector appear to be transmitted more rapidly than similar shocks in other sectors. Both theory and evidence suggest that the probability, strength, and breadth of any contagious systemic risk is greater for banking, the larger and more significant is the bank experiencing the initial shock. It follows that the transmission and danger of systemic risk is likely to differ depending both on the strength of the initial shock and on the characteristics of the bank initially affected.

In the absence of guarantees, units on the transmission chain may reasonably be expected to attempt to protect themselves from losses from shocks. For banks, this requires them to charge higher interest rates on riskier investments, monitor their counterparties carefully, require more and better collateral, and have sufficient capital to absorb any losses from their association with an infected bank or banks or from runs by their depositors. Rochet and Tirole (1996) model such a structure. In general, for the initial shock to be successfully transmitted and bring down other banks, losses must exceed capital at each bank along the chain. Banks with sufficient capital to absorb the transmitted losses will remain solvent, although they may be weakened, and stop the cascading. The amount of capital required to remain solvent depends both on the exposure of a particular bank to other units and on the expectations of the magnitude of any shocks. These may be expected to vary both among banks and through time for any one bank. Nevertheless, ceteris paribus, the more banks or other institutions are leveraged, the smaller is the adverse shock that is required to drive a bank or

other institution into insolvency and the greater is the likelihood that any losses will be passed through along the transmission chain. In addition, the faster the transmission occurs, the more difficult it is for units to develop their protection after the shock has occurred and the more important it is for them to have sufficient protection in place ahead of time. This differentiates the financial sector from most other sectors, where the transmission of adverse shocks is slower and units generally have time to act to protect themselves after the initial shock has occurred.

Random contagious systemic risk is considered particularly dangerous and undesirable because it spills over to and damages perceived economically solvent as well as insolvent banks. Although it is relatively easy to distinguish the solvent from the insolvent ex-post after the crisis, it can be difficult in practice to do so ex-ante before a crisis. Ex-ante information is frequently not sufficiently available, timely, or reliable to make the distinction with any great confidence. Banks, often with the active assistance and encouragement of their governments, frequently fail to disclose relevant information and , particularly as they approach insolvency, tend to underreserve for loan losses and use other questionable and sometimes even fraudulent accounting procedures to inflate their reported capital ratios.

II Historic Evidence of Contagious Systemic Risk

Clusterings of bank failures are observed frequently. But do they reflect systemic risk? The empirical evidence depends on the definition used. Almost tautologically, systemic risk is observed most frequently when it is defined as a broad big shock. But, as noted earlier, this definition is silent on the existence or transmission of any contagion. Common shock systemic risk, particularly in the short-term, appears to be more frequent than chain reaction systemic risk. Systemic risk, when it does occur, appears to be both rational and confined primarily to "insolvent" institutions and not to randomly affect solvent banks fatally (Kaufman, 2000a).

With respect to banks, at least in the United States, there is little if any evidence of contagious systemic risk that causes economically solvent banks to become economically or legally insolvent, either before or after the introduction of federal government guarantees and insurance (Kaufman, 1994). U.S. banks have been studied most thoroughly because of their large number, good historical data, and minimum government ownership or control. The evidence indicates that problems at one or a group of banks do spill over to other banks, but almost exclusively only to those banks with the same or similar portfolio risk exposures and subject to the same shock. There is little if any empirical evidence that the insolvency of an individual bank directly causes the insolvency of other, economically solvent banks, or that bank depositors run on economically solvent banks very often and that it drives these banks into insolvency when they do.

A. Potential Exposure

A recent study has simulated the likelihood of direct causation or knock-on contagion in the U.S. through Fed funds transactions and other interbank exposures for the period February-March 1998 (Furfine, 1999). These funds are de-jure uninsured and, since the Depositor Preference Act of 1993, Fed funds are subordinated to all domestic deposits. The study finds that, if a high loss rate of 40 percent, well above average bank loss rates experienced even in the crises of the 1930s and 1980s, is assumed, the failure of the largest debtor bank in the U.S. Fed funds market would cause the economic insolvency of only 2 to 6 other banks holding less than 1 percent of total bank assets. The failure of smaller debtor banks would have lesser effects. If the two largest debtor banks failed at the same time, fewer than 10 other banks would fail. All other banks held sufficient capital to absorb the losses. If the assumed loss rate were reduced to 5 percent, approximately that experienced in the Continental Illinois Bank failure in 1984 (see below), no other banks would fail.

The results are not changed greatly when total interbank exposures are simulated. The simultaneous failure of the largest two debtor banks causes more than 15 other banks with more than 3 percent of total bank assets to fail only when the loss rate exceeds 65 percent. Such a loss rate

would be exceedingly high for large resolved banks in the U.S. Even at the height of the banking crises in the 1980's, when regulators regularly forbore and delayed resolving insolvencies until after significant runs by uninsured depositors had effectively stripped the banks of their best assets and increased losses as a percent of the remaining assets, the losses at large commercial banks rarely exceeded 10 percent of assets (Kaufman, 1995b). At these loss rates, Furfine's simulations predict only minor knock-on effects. Moreover, these results overstate the damage to other banks as they assume failure when only tier 1 (basically equity capital) rather than total capital, including tier 2 (basically subordinated debt and limited loan loss reserves), is depleted. Similarly, simulation studies of the Swiss and Italian domestic interbank markets also report a relatively small "threat to financial market stability" from default by one bank (Sheldon and Maurer, 1998 and Angelini, Maresca, and Russo, 1996).

B. Historical Experience

1. Chain reactions

Nor is the evidence any different for actual failures. When the Continental Illinois Bank, the seventh biggest bank in the U.S. at the time with assets in excess of $32 billion, failed in mid-1984, it was the largest correspondent bank in the country. Nearly 2,300 other banks held deposits at or loaned funds to the Continental. Because when it failed the FDIC fully protected all creditors, no bank suffered any losses. But what would have happened if all creditors had not been fully protected? Not very much! Some 1,325 banks had exposure of less than $100,000 and were thus fully insured by the FDIC. Although the remainder had some risk exposure, a study by the staff of the House Banking Committee found that had Continental's loss been as large as 60 cents on the dollar (a recovery rate on assets of only 40 percent), which was more than ten times either the estimated loss or the actual loss as of the time of its resolution, only 27 banks would have suffered losses in excess of their reported capital and become insolvent (U.S. Congress, 1984). These losses

would have totaled only $137 million. Another 56 banks would have suffered losses equal to between 50 and 99 percent of their total capital in an amount totaling $237 million. If the Continental's loss had been smaller, say, 10 cents on the dollar, still more than twice the actual loss, no other bank would have suffered a loss greater than its capital and only two banks would have suffered losses in excess of 50 percent of their capital. Banks had apparently acted to protect themselves by limiting their uninsured exposures relative to their capital and monitoring their positions carefully. Given the relatively small size of the loss, it is also unlikely that any of the banks with $100,000 or less in deposits at the Continental, which were fully insured, would have failed had these deposits been uninsured, as they maintained capital well in excess of this amount.

Lastly, spillover losses to U.S. and some foreign banks when the Herstatt bank in Germany failed and was closed by the authorities in 1974 are often cited as evidence of systemic risk. Indeed, "Herstatt risk" has become a generic term to describe cross-border settlement risk for banks. Losses were primarily suffered by banks that had entered into foreign exchange transactions with Herstatt and occurred not so much because of losses at Herstatt, but because the exchange in payments between these banks and Herstatt was not simultaneous due to differences in time zones. The counterparty banks paid the mark side of the transactions to Herstatt during its working day, but the German authorities closed the bank at the close of business in Germany before Herstatt was scheduled to make the corresponding dollar payments to the counterparty banks during their business day, primarily in New York, many hours later (Eisenbeis, 1995). If the German authorities had waited to the end of the business day in New York before closing the Herstatt bank, the counterparty losses would have been greatly reduced if not avoided altogether. Instead, they would have accrued to Herstatt depositors and the German bank deposit insurance fund. Thus, much of the spillover from the Herstatt Bank to other, primarily foreign, banks from these transactions represents more of a government risk than a market risk. Even so, no other bank failed as a result of this debacle.

2. Common shock reassessment

Except for fraud, clustered bank failures in the U.S. are almost always triggered by adverse conditions in the regional or national macroeconomies or the bursting of asset price bubbles, particularly in real estate, and not by exogenous "sunspot" effects (Allen and Gale, 1998, Benston and Kaufman, 1995, and Kaufman, 1999). That is, banks fail from exposure to the same common shock, such as a depression in agriculture, real estate or oil prices (Cottrell, Lawlor and Wood, 1995), not from direct spillover from other banks without themselves being exposed to the shock. Post mortems of failed banks in the U.S. indicate that in almost every instance since the introduction of deposit insurance, the bank was already economically insolvent for many months and, on occasion in the 1980s, even for years before it was resolved by the regulators (Kaufman, 1995b).

A study of national bank failures from 1865 through 1936, shortly after the introduction of federal deposit insurance in 1933, reported that the most cited cause of failure was local financial distress followed by incompetent management. Runs or loss of public confidence were cited in less than 5 percent of all 4,449 causes listed for the 2,955 failures surveyed (O'Connor, 1938).

Sudden unexpected bad news about a particular bank or group of banks appears to ignite a round of reexamination of other banks by market participants to determine their risk exposures. Although deposit flows and stock values of a large group of banks may be immediately affected adversely, the sorting out process appears to occur relatively quickly. To the extent deposit flows and particularly stock values of innocent banks (i.e., those with high capital or different risk exposures) are adversely affected by a bank failure or other adverse event, they rebound within a day or two so that no lasting significant announcement effects on stock values are observed (Kaufman 1994).[3] Similarly, a recent study of stock market reaction to the disclosure of supervisory actions by

[3] It is possible that the bad news event depressed all stock prices, so the innocent banks' stock prices were affected adversely but less so than those of the guilty banks.

bank regulators finds that the announcements can cause spillover effects to other banks. However, "only banks in the same region...[or] with similar exposures are affected" (Jordan, Peek and Rosengren, 2000, p. 298).

Even during the Great Depression of 1929-1933 and at the height of the banking crisis and bank runs in Chicago in June 1932, the evidence suggests that liquidity problems and depositor runs rarely, if at all, drove economically solvent independent banks into insolvency (Calomiris, 1999; Calomiris and Mason, 1997 and 2000; and Wicker, 1996). In these difficult times, at the margin, depositors and other banks were still able to differentiate economically solvent from insolvent banks rather quickly. Moreover, almost all the banks that failed during the depression were small unit banks. While the annual bank failure rate was 6, 11, 8, and 28 percent in 1930, 1931, 1932, and 1933, respectively, the percentage of deposits in these banks was only 2, 1, 2, and 12 percent of deposits in all banks. Benston et al. (1986, p. 62) concluded that "these failures occurred primarily because of adverse local business conditions rather than because of spillover from other failed banks outside their market areas." However, as in most previous severe U.S. banking crises, there were runs out of bank deposits and into currency, particularly by smaller depositors, so that the aggregate currency to deposit ratio increased and aggregate bank credit and deposits declined. Nevertheless, few, if any, initially solvent banks appear to be buried in the graveyard of failed U.S. banks. To the extent contagion exists in banking, at least in the U.S., it appears to be rational and information based, ignited by a common shock.[4]

Nor is there empirical evidence that bank failures ignited downturns in the macroeconomy. Rather, again at least for the United States, the direction of causation appears to be primarily from downturns in the macroeconomy and the stock market (asset price bubbles) to increases in bank failures (Benston, et al., 1986; Benston and Kaufman, 1995; Mishkin, 1991; and Calomiris and

[4] The same conclusion holds in cases where a lesser adverse shock did not lead to bank failures but only to reduced profits as reflected in reductions in dividends (Bessler and Nohel, 2000).

Gorton, 1991). Bank failures, however, are likely to exacerbate the magnitude of the downturns that caused them. The extent of adverse spillover from the banking sector to other sectors depends on the degree of leverage elsewhere. The higher the leverage of business firms and households, the more vulnerable are these sectors to losses and insolvencies from bank failures (Davis, 1995 and Kaufman, 2000a). Perhaps one of the reasons for the small negative effects of bank failures on other banks and the macroeconomy, at least in recent years in the United States, relative to those that might have been feared, is the unique policy of effectively giving both insured and uninsured depositors at failed banks immediate access to the full amount of their insured funds and the estimated recovery value of their uninsured funds, respectively. Thus, there is no (or at worst only a brief) loss of liquidity to depositors or the economy.

In most other countries, both insured and uninsured depositors are generally not paid either their claims until months, if not years, after the bank is resolved as the funds are collected by the receiver. (Kaufman and Seelig, 2002). Indeed, a European bank analyst has observed that:

> The issue is not so much the fear of a domino effect where the failure of a large bank would create the failure of many smaller ones; strict analysis of counterparty exposures has reduced substantially the risk of a domino effect. The fear is rather that the need to close a bank for several months to value its illiquid assets would freeze a large part of deposits and savings, causing a significant negative effect on national consumption (Dermine, 1996, p. 680).

That is, depositors fear the loss of liquidity in bank failures as much if not more than the loss of credit value, particularly when the credit losses are nonexistent if the deposits are fully insured and relatively small for uninsured depositors.

In many countries, particularly developing and transition economies, evidence of contagious systemic risk in banking is frequently confused with crises stemming from the freezing, confiscation, or devaluation of bank deposits (either in domestic or foreign currency) or the defaulting on bank-held government securities by governments. That is, the bank problems frequently arise not from the

actions of the banks themselves in their banking activities, but from the use of the banks by the governments to pursue their nonbanking policies. And when the crises are bank made, they almost always reflect flagrant abuses that were permitted if not abetted by the government and the inability of the government to resolve insolvent banks in a timely and efficient manner. (Whitehouse, 1999, describes such a crisis recently in Russia.) These crises are more accurately defined as government created crises rather than bank created crises.

The above evidence strongly suggests, that in the absence of de-jure deposit insurance, depositors and other bank creditors take sufficient protective action on their own to greatly reduce the probability both of losses to themselves and of spillover to other banks. Much if not all of any externality of contagion appears to be priced by the market and internalized. This conclusion holds even when there appears to be some positive probability that some or all of the affected claimants may be ex-post partially or totally protected de-facto. It is also likely that the even stronger protective actions would have been taken by most bank stakeholders in the absence of regulations or other regulatory actions that project a perception of safety. In practice, private banking appears to be no less stable in an atmosphere of little government prudential regulation than either with more such regulation or other, nonregulated industries.

III Dealing with Systemic Risk

In light of the foregoing discussion of theory and evidence, how should bank regulators and supervisors deal with systemic risk? The preceding analysis clearly indicates both that private market incentives can and do play a major role in limiting systemic risk and that the government should always be highly sensitive to whether its actions are undermining or reinforcing the private mechanisms (Kaufman, 1996). The latter is particularly important when it comes to the design and use of various safety net measures. But the issues are not easy ones, and it is useful to undertake a normative analysis in terms of the three, not mutually exclusive, definitions of systemic risk set forth in Part I.

A. Macro Shock

If there are sharp drops in asset or currency values that affect the entire economy of a nation, banks will not be immune. Indeed, history has shown them to be particularly vulnerable, as debtors default and collateral depreciates. The most recent example is the banking and currency crises that hit Indonesia, Korea, Malaysia and Thailand in 1997 and Russia and Brazil in 1998. All banks will incur losses in severe depressions or when asset bubbles burst; weaker banks will become insolvent, and failures may spread beyond them in the manner described below.

By far the most important contribution any government can make to preventing macro shocks and their effects is to avoid adopting monetary and fiscal policies that produce them or to introduce policies that moderate them. That is a subject far beyond the scope of this paper. However, it should be noted that the economies of many countries are small and undiversified, and hence quite vulnerable to disruptions from the outside, which they are in little or no position to control or offset (Brock, 1992). This paper takes the occurrence of macro shocks, for whatever internal or external reasons, as given.

To protect themselves against such contingencies, banks employ various risk management techniques, including maintaining higher capital ratios to absorb unexpected losses. But it is hard to predict the probability and magnitude of extreme events, and hence the level of capital that an individual bank, given its risk preferences, would wish to maintain. Indeed, in most countries, banks do not even need to try to protect themselves against "one in a hundred years" events since their governments have adopted de jure or de facto deposit insurance or other guarantee arrangements, which largely free the individual bank from pressure from depositors at risk and substitute regulatory capital requirements for market requirements. The evidence indicates that macro failures (as opposed to individual bank failures) are usually due much more to shortcomings in government monetary, fiscal, or regulatory policy than to shortcomings in bank management. Hence, the cost of those

shortcomings is more appropriately placed on the government than on the bank or its depositors (Scott and Mayer, 1971). Nevertheless, the responses of the bank and depositors to the poor government policies are likely to exacerbate risk taking, the fragility of financial sector, and the magnitude and damage of the macroshock (Crockett, 2000).

For example, federal deposit insurance has proven effective in stopping bank runs in the U.S. and that avenue of contagion spread--but at a price. The evidence indicates that it is accompanied by an increase in the costs of the initial insolvencies in two ways (Gupta and Misra, 1999). First, those institutions were relieved of whatever market discipline could have been exerted by insured claimants. If the deposit insurance is underpriced, as is not uncommon, it contributes to a moral hazard problem in which bank management is induced to take on greater risk. Second, bank supervisors have strong incentives to delay recognition of insolvencies and payment for their losses. In any political regime, it is advantageous to defer costs beyond one's term in office, if possible. As recognition and resolution are delayed, the likelihood is that the losses will grow at a rapid rate**.** Incumbent management, if left in control, has every reason to take high risk (and even negative present value) investments, while government liquidators have limited expertise and weak incentives to profit-maximize.

The evidence in the U.S. savings and loan debacle of the 1980s supports this bleak scenario. The negative net worth in 1983 of the S&L industry as a whole was estimated at around $25 billion after the sharp decline in interest rates had reduced much of the earlier losses due to interest rate risk (Ely, 1993 and Kane 1980). Nevertheless by 1995, with the end of the long-deferred resolution process, the cost to taxpayers had climbed to around $160 billion, most all attributable to losses from credit risk (FDIC, 1998). There were few bank runs in the 1980s (mostly by uninsured depositors) under deposit insurance, but the aggregate losses of the institutions were of the same order of magnitude (about 3 percent of 1990 GDP) as in the Great Depression years of 1930-33 without deposit insurance and with numerous bank runs (Calomiris, 1998).

The undesirable side effects of deposit insurance have produced efforts to counteract them by regulation. The FDIC Improvement Act (FDICIA) of 1991 changed a flat-rate deposit insurance assessment fee to a risk-related premium system to address the moral hazard problem, and instituted a 'trip-wire' scheme of prompt, statutorily-mandated corrective actions and resolution of insolvencies that was intended also to counteract the bureaucratic tendencies toward forbearance and postponement (principal - agent conflict). The Basel Committee on Banking Supervision in July 1988 adopted a set of risk-based minimum capital standards for international banks, in part to offset the substitution of government guarantees (public capital) for private capital in banks (Peltzman, 1970). These regulations, however, in turn produce efforts by banks to take steps to avoid those that they find onerous and arbitrage against (game) those they find inadequate, and that leads to another layer of distortion costs (Jones, 2000). For example, the initial Basle Accord assigned only a 20 percent risk-weight to short-term interbank loans. Banks in the East Asian countries borrowed heavily in dollars in the early 1990s and relent at higher rates in their domestic currency, which helped precipitate a crisis when their exchange rates had to be devalued. But foreign exchange risk was not captured in the Basle standards and the lending bank creditors were generally protected in the ensuing IMF rescues, again to the impairment of market discipline. The Basel Committee in 1999 and 2001 proposed reforms in its standards to meet these objections. It refined the risk categories and weights, added capital requirements for operational risk, permitted the use of bond ratings assigned borrowers by recognized rating agencies to categorize risk classes, permitted some more sophisticated banks to use their own internal models to evaluate credit risk, and expanded the sole emphasis on minimum capital requirements (pillar one) to include provisions for improving supervisory review (pillar two) and market discipline (pillar three). Nevertheless, many shortcomings remain. Recommendations for correcting these shortcomings have been proposed by

the U.S. Shadow Financial Regulatory Committee (2000 and 2001), among others. I but many shortcomings remain (U.S. Shadow Financial Regulatory Committee, 2000 and 2001).

The moral hazard and principal-agent problems that poorly priced deposit insurance creates, or at least exacerbates, suggest that the cost-benefit balance would be improved if insurance coverage were provided beyond small accounts at most only in the event of a macro shock. In all other failures, claimants on the bank would not be protected by the government *de-facto* as well as *de-jure* and would in their own interest have to exert market discipline on its management at all times. As noted, it is more problematic to assign preventive responsibility in the case of macro policy failures to the bank or its depositors. But it would be difficult ex ante for regulators to ascertain the beginning of a macro crisis, or to draw the line as to when a number of individual failures fall into that category. And politically, it would no doubt be a distinction difficult to sell.

But, if it were not feasible to limit the government safety net to macro shocks, it is feasible to structure its operation to reduce the adverse side effects. That was the goal of the Congress in enacting FDICIA in 1991. The FDIC was instructed to establish a risk-based assessment system for deposit insurance, replacing the half-century old uniform flat rate and its contributions to moral hazard (Shiers, 1994). Supervisory discretion to forbear was intended to be sharply narrowed, though hardly abolished, by specification of a structure of mandatory, presumptive, and optional corrective actions, geared to a set of five declining capital levels. In particular, when an institution became "critically undercapitalized" (with a ratio of tangible equity to total assets of less than 2 percent), the supervisor was to set in motion a process of relatively speedy sale or closure (Benston and Kaufman, 1994 and Scott, 1993). And in resolving a failed institution, the FDIC was enjoined to employ the least costly method of meeting its insurance obligation and not to protect creditors or uninsured depositors if that would increase its losses. There is an exception for cases of systemic risk, but it is viewed skeptically; to invoke it, FDIC must have the concurrence in writing of two-thirds of the Federal Reserve Board and the Secretary of the Treasury (after consultation with the

President), and then recover its loss by a special assessment on the banking industry. It is unlikely that "too big to fail" in which uninsured depositors are fully protected against loss will be as much relied on in the future as in the past.

There are other aspects of the current deposit insurance system in the United States that deserve comment when discussing the handling of macro shocks. The impact of bank failures on deposit holders, the money supply and the economy is reduced by two features. First, as noted earlier, depositors are not cut off from their funds for any appreciable period of time when their institutions are resolved; insured deposits are paid within a business day or two, and advance dividends on uninsured claims are paid at about the same time, based on the estimated recovery value of the failed bank's assets (FDIC, 1998; Kaufman and Seeley, 2000). Simply shutting down a failed bank for an indeterminate period and freezing deposits, as supervisors have often done in some countries, feeds incentives to run on all possibly affected banks at the first suggestion of trouble. Second, the policy of prompt resolution of insolvent or near-insolvent banks, if properly implemented by the supervisory agencies, should result in relatively small if any losses to depositors. If bank failure produces no or only moderate losses (except to shareholders), they can be absorbed by the capital buffer at other banks and there should be little contagion or systemic risk. This underlines the importance of banking agencies having and enforcing credible and predictable closure (resolution) rules, prior to the development of massive losses as in the 1980s.

B. Failure Chains

With respect to chain reaction or direct causation failures flowing through interconnected institutions, there are two lines of attack. Supervisors, as just noted, can reduce the amount of loss in the initial failure by prompt closure rules. But private banks have many ways to protect themselves against defaults by their counterparties, e.g. careful monitoring and exposure ceilings, and it is important that regulation not undermine their incentives to do so (Rochet and Tirole, 1996). There

should be no deposit-insurance coverage of interbank transactions; there could be no weaker claim for customer protection than that of another institution in the same business engaging in informed and voluntary dealings. A fortiori, there should be no safety-net policy of too big to fail (meaning too big not to pay off in full all depositors and even other creditors at failed institutions), which eliminates entirely the need for counterparties to the largest banks to take even elementary measures to reduce their risk exposure.

In the current technological environment, the greatest volume of interbank transactions takes place through the large value payments system, and it is now often viewed as a focal point of systemic risk (Corrigan, 1987). In 1999, the average daily value of funds transfers through Fedwire was almost $1.4 trillion, and of Government securities about $700 billion (Federal Reserve Board, 2000). If the failure and resolution of a major bank caused it to be unable to meet its payment obligations in these transactions, there might be fear of a cascade of defaults throughout the system, producing a 'gridlock.' The Fed's response was to guarantee payment of transfers made by a bank on Fedwire, thereby assuming the credit risk that they might not be fully collectible at the end of the day. Up until 1994, the Fed's guarantee of such daylight overdrafts was provided free. That meant, of course, that banks had little reason to pay close attention to the financial condition of their interbank payments counterparties, and the Fed's exposure on daylight overdrafts grew accordingly (Hancock, Wilcox and Humphrey, 1996).

Since 1994, the Fed has tried to limit the problem by making a charge (at a relatively low current annualized rate of 0.36 percent) for daylight overdrafts and by setting caps on net debit positions. But it still funds about 40 percent of funds transfers by extending daylight overdraft credit (McAndrews and Rajan, 2000), which in 1999 ran at an average magnitude of $50 billion per minute (Zhou, 2000). Once again, regulation has served to weaken banks' incentives to protect themselves. Without payment finality, banks would themselves limit their exposure by monitoring and rating their counterparties, charging accordingly for credit extended, limiting the size of their credit

positions and requiring collateral. Most importantly, U.S. banks would have strong reasons to push for the full implementation of a real-time gross settlement system that transfers only good funds (payment vs. payment and delivery vs. payment) without government credit guarantees.

Governments can impair, sometimes severely, an institution's efforts to manage its risks and portfolio prudently by imposing policies of credit allocation toward "favored" borrowers, be they cronies, perceived socially desirable sectors, or politically potent voter groups. This has infected the banking systems of most countries to varying degrees, particularly in countries that permit state owned banks. To stay close to home, the United States for half a century legally restricted thrift institutions for the most part to investment in local residential construction and ownership and to finance long-term fixed-rate residential mortgage loans with short-term deposits. This left them woefully undiversified in both a geographical and a product sense. The consequences were no small factor in the S&L catastrophe of the 1980s (Scott, 1990).

Another chain of transmission of the implications of adverse shocks to banks is sometimes said to be complex transactions, particularly on derivatives markets, between a very large bank and both other banks and nonbank parties rather than losses to uninsured depositors at the affected bank. The need to unwind these positions quickly before maturity may generate large fire-sale losses and disorderly markets. But the PCA provisions of FDICIA reduce, even if they do not eliminate, this possibility by requiring bank supervisors to become progressively more familiar with financially troubled banks as their capital ratios decline through the undercapitalized zones. This should provide the regulators with sufficient time to plan and prepare for the sale of an institution before it reaches the 2 percent equity to capital ratio closure rule, or shortly thereafter within the permissible 90 day (extendable to 270 day) time period to minimize any disorderly ramifications of the resolution. If successful, the regulators can achieve the dual public policy goal of having the uninsured depositors at risk and maintaining orderly markets without invoking the systemic risk or

too big to fail exemption. Indeed, if the regulators need some additional time to orderly unwind very large and complex banks, provisions exist for the chartering and temporary operation of a bridge bank for this purpose.

C. Common Shock / Reassessment Failures

The other mechanism of contagion spread identified in Part I was the failure or near-failure of one or several institutions from losses originating elsewhere and the reassessment by depositors, creditors, and shareholders of other institutions (common shock contagion). The debate over this category has been whether the reassessment of risk, in light of the new information revealed by the initial failures, is rational and discriminating or panic-driven and undifferentiated.

The evidence reviewed in Part II indicates that depositors have done much better than they are usually given credit for in distinguishing insolvent from solvent banks, and shutting down the former through runs faster than supervisors might have been inclined to do. But it is not necessary to definitively resolve that debate in order to draw lessons from it for the banking agencies.

The obvious lesson is that banking supervisors should not impede, but instead enhance, the disclosure of information about the financial condition of banking institutions. Bank depositors, like bank counterparties, can in many instances protect themselves if all reason to do so is not destroyed. At the same time, supervisors should facilitate their ability to differentiate among banks in a time of crisis or uncertainty.

One step by supervisors to enhance bank transparency would be to permit, rather than forbid, banks disclosing contents from their examination reports and supervisory rating (Jones and King, 1995). The banking agencies, viewing examination reports as their private property, refused to allow access to them by a bank's outside auditors. Congress required such access by statute in 1989, but that provision was eliminated two years later in FDICIA. The current practice of mandatory secrecy, a skeptic might argue, is apparently founded either on the notion that depositor confidence must be based on ignorance or on the proposition that management is willing to reveal

negative information to examiners because they believe nothing much will result from it, compared to the consequences of telling the world at large, or perhaps on the reluctance of regulators to face a market test. None of these positions is reassuring.

Another step would be to encourage banks to disclose market values of all assets and liabilities in financial statements, at least in footnotes. Not all items can be so valued with precision, but many more can be estimated reasonably accurately, and are, in banks' internal risk management models and calculations. If proposals for larger banks to issue uninsured subordinated debt (U.S. Shadow Financial Regulatory Committee, 2000) bear fruit, there will be greater market demand for disclosure of such information. FDICIA enjoined the banking agencies to develop within a year a method "to provide supplemental disclosure of the estimated fair market value of assets and liabilities, to the extent feasible and practicable, in any balance sheet, financial statement, report of condition, or other report." (12 U.S.C.A. §1831n(a)(3)(D).) Unfortunately, nothing came of this Congressional mandate.

IV Conclusion

The major point of this paper has been that many bank regulatory actions have been double-edged, if not counterproductive. With regard to systemic risk, there may well be circumstances in which there cannot be complete reliance on private ordering, but excessive, although well intentioned, reliance on deposit insurance and other government safety-net measures has also been very costly worldwide.

Our purpose has been to emphasize some of those costs, and urge bank regulators to be more sensitive than they have often been to how their actions can impair private market incentives and thus reduce the benefits of their actions. Indeed, we suggest a deliberate strategy of seeking to minimize the scope of the government's backup role and to maximize the effectiveness of private actors as the first line of defense against systemic risk. That approach was not much in evidence

through the latter two-thirds of the 20th century. It is not possible either theoretically or empirically, to draw up a comprehensive balance sheet of all the benefits and costs produced over that period by such bank regulation and intervention, but, in our own view, on net, the costs outweighed the benefits and the regulators may well have contributed to systemic risk as much as they have retarded it. We hope that a new strategy that reduces potentially counterproductive government policies will play a larger role in the 21st century.

REFERENCES

Aharony, Joseph and Izhak Swary. 1996. "Additional Evidence on the Information-Based Contagion Effects of Bank Failures." *Journal of Banking and Finance*, January, 57-69.

Allen, Franklin, and Douglas Gale, "Optimal Financial Crises", *Journal of Finance*, August 1998, pp. 1245-1284.

Angelini, P., G. Maresca, and D. Russo. 1996. "Systemic Risk in the Netting System." *Journal of Banking and Finance*, June, 853-868.

Bank for International Settlements. 1994. *64th Annual Report*. Basel, Switzerland..

Bartholomew, Philip and Gary Whalen. 1995. "Fundamentals of Systemic Risk." in George G. Kaufman, ed., *Research in Financial Services: Banking, Financial Markets, and Systemic Risk* (Vol. 7), Greenwich, CT: JAI Press, 3-17.

Bennett, Michael. 1999. "Banking Deregulation in Indonesia: An Updated Perspective in Light of the Asian Financial Crisis." *University of Pennsylvania Journal of International Economic Law*, 20: 1-59.

Benston, George, Robert Eisenbeis, Paul Horvitz, Edward Kane, and George Kaufman. 1986. *Perspectives on Safe and Sound Banking*. Cambridge, MA.: MIT Press.

Benston, George and George Kaufman. 1994. "The Intellectual History of the Federal Deposit Insurance Corporation Improvement Act of 1999" in George G. Kaufman, ed., *Reforming Financial Institutions and Markets in the United States*, Boston: Kluwer Academic, 1-19.

Benston, George and George Kaufman. 1995. "Is the Banking Payments System Fragile?" *Journal of Financial Services Research*, December, 209-240.

Bessler, Wolfgang and Tom Nohel. 2000. "Asymmetric Information, Dividend Reductions, and Contagion Effects in Bank Stock Returns." *Journal of Banking and Finance,* November, 1831-1849.

Board of Governors of the Federal Reserve System "Policy Statement on Payments System Risk," Washington, D.C.: May 30, 2001.

Brock, Philip (ed.). 1992. *If Texas Were Chile - A Primer on Banking Reform*. San Francisco: ICS Press.

Calomiris, Charles. 1999. "Runs on Banks and Lessons of the Great Depression." *Regulation*. 22:1: 4-7.

Calomiris, Charles and Gary Gorton. 1991. "The Origins of Banking Panics: Models, Facts, and Bank Regulation" in R. Glenn Hubbard, ed., *Financial Markets and Financial Crises*, Chicago: University of Chicago Press, 109-173.

Calomiris, Charles W. and Joseph R. Mason. 1997. "Contagion and Bank Failures During The Great Depression: The June 1932 Chicago Banking Panic." *American Economic Review*. December, 863-883.

Calomiris, Charles W. and Joseph R. Mason. 2000. "Causes of U.S. Bank Distress During the Depression." Working paper 7919 Cambridge, Ma.: National Bureau of Economic Research, September.

Corrigan, Gerald. 1987. "Financial Market Structure: A Longer View," in Federal Reserve Bank of New York *Annual Report.*

Cottrel, Allin, Michael Lawlor and John Wood. 1995. "What Are the Connections between Deposit Insurance and Bank Failures?" in Allin Cottrel, Michael Lawlor and John Wood, eds., *The Causes and Costs of Depository Institution Failures*, Norwell, Ma.: Kluwer, 163-97.

Crockett, Andrew. 1997. "Why is Financial Stability a Goal of Public Policy?" in *Maintaining Financial Stability in a Global Economy*. Kansas City, Mo.: Federal Reserve Bank of Kansas City, 7-36.

Crockett, Andrew. 2000. "Marrying the Micro-and Macro-Prudential Dimensions of financial Stability. " Basel; Switzerland: Bank for International Settlements, September 21.

Davis, Philip. 1995. *Debt, Financial Fragility, and Systemic Risk*. Oxford: Oxford University Press.

Dermine, Jean. 1996. "Comment." *Swiss Journal of Economics and Statistics*, December, 679-682.

Diamond, Douglas and Philip Dybvig. 1983. "Bank Runs, Deposit Insurance and Liquidity." *Journal of Political Economy*, June, 401-419.

Eisenbeis, Robert. 1995. "Private Sector Solutions to Payments System Fragility." *Journal of Financial Services Research*, December, 327-349.

Ely, Bert. 1993. "Savings and Loan Crisis" in David R. Henderson, ed., *The Fortune Encyclopedia of Economics*. New York: Warner Books, 369-375.

Federal Deposit Insurance Corporation. 1998. *Managing the Crisis: The FDIC and RTC Experience, 1980-1990,* Washington, D.C.

Federal Reserve Board. 2000. "Fedwire Statistics: Annual Volume and Value" www.Federalreserve.gov/PaymentSystems/FedWire

Furfine, Craig. 1999. "Interbank Exposures: Quantifying the Risk of Contagion." Working Paper, Basle: Bank for International Settlements. September.

George, E.A.J. 1998. “The New Lady of Threadneedle Street," Governor's Speech, Bank of England, London, February 24.

Gupta, Atul and L. Misra. 1999. "Failure and Failure Resolution in the U.S. Thrift and Banking Industries." *Financial Management* 28: 4, 87-105.

Hancock, Diana, James Wilcox and David Humphrey. 1996. "Intraday Management of Bank Reserves." *Journal of Money, Credit and Banking*. 28: 4, 870.

Herring, Richard and Susan Wachter. 1999. *Real Estate Booms and Banking Busts - An International Perspective*. Occasional Paper 58. Washington, D.C.: Group of Thirty.

Jones, David. 2000. "Emerging Problems with the Basel Capital Accord: Regulatory Capital Arbitrage and Related Issues." *Journal of Banking and Finance*. 20: 1-2. 33-58.

Jones, David and Kathleen King. 1995. "The Implementation of Prompt Corrective Action: An Assessment." *Journal of Banking and Finance*. June, 491-510.

Jordan, John , Joe Peek and Eric Rosengren. 2000. "The Market Reaction to the Disclosure of Supervisory Actions: Implications for Bank Transparency." *Journal of Financial Intermediation,* July, 298-319.

Kaminski, Graciela and Carmen Reinhart. 1998. "On Crises, Contagion, and Confusion." Working Paper, Washington, D.C., George Washington University, December.

Kaminski, Graciela and Sergio Schmukler. 1999. "What Triggers Market Jitters: A Chronicle of the Asian Crises." *Journal of International Money and Finance*, December, 537-560.

Kane, Edward. J. 1980. “Regulation, Savings and Loan Diversification, and the Flow of Housing Finance,” *Savings and Loan Asset Management Under Deregulation*, San Francisco: Federal Home Loan Bank of San Francisco, December, 81-109.

Kane, Edward. 1989. *The S & L Insurance Mess: How Did It Happen?* Washington, D.C. Urban Institute Press.

Kaufman, George. 1994. "Bank Contagion: A Review of the Theory and Evidence." *Journal of Financial Services Research,* April, 123-150.

Kaufman, George. 1995a. "Comment on Systemic Risk" in George G. Kaufman, ed. *Research in Financial Services: Banking, Financial Markets, and Systemic Risk* (Vol. 7), Greenwich, CT: JAI Press, 47-52.

Kaufman, George. 1995b. "The U.S. Banking Debacle of the 1990s: Overview and Lessons." *Financier* May, 9-26.

Kaufman, George. 1996. "Bank Failures, Systemic Risk, and Bank Regulation." *CATO Journal*, Spring/Summer, 17-45.

Kaufman, George. 1999. "Central Banks, Assets Bubbles, and Financial Stability." in Mario Blejer and Marko Skreb, eds., *Central Banks, Monetary Policies, and the Implications for Transition Economies*. Boston: Kluwer, 143-183.

Kaufman, George. 2000a. "Banking and Currency Crises and Systemic Risk: A Taxonomy and Review," *Financial Markets, Institutions and Instruments*, May, 69-131.

Kaufman, George. 2000b. "Banking and Currency Crises and Systemic Risk: Lessons From Recent Events." *Economic Perspectives* (Federal Reserve Bank of Chicago), Third Quarter, 9-28.

Kaufman, George and Steven Seelig. 2002. "Post-Resolution Treatment of Depositors at Failed Banks and the Severity of Bank Crises, Systemic Risk, and Too-Big-To-Fail," *Economic Perspectives*, (Federal Reserve Bank of Chicago), Second Quarter, 27-41.

Kho, Bong-Chan and René Stulz. 2000. "Banks, the IMF, and the Asian Crisis." *Pacific-Basin Finance Journal*. May, 177-216.

McAndrews, James and Samira Rajan. 2000. "The Timing and Funding of Fedwire Funds Transfers." *Economic Policy Review* (Federal Reserve Bank of New York), July, 2-17.

Mishkin, Frederic. 1991. "Asymmetric Information and Financial Crises: A Historical Perspective." in R. Glenn Hubbard, ed. *Financial Markets and Financial Crises*. Chicago: University of Chicago Press, 69-108.

Mishkin, Frederic. 1995. "Comment on Systemic Risk", IN George Kaufman, ed. *Research in Financial Services: Banking, Financial Markets, and Systemic Risk* (Vol. 7), Greenwich, CT: JAI Press, 31-45.

O'Connor, J.F.T. 1938. *The Banking Crisis and Recovery Under the Roosevelt Administration*. Chicago: Callaghan and Co.

Peltzman, Sam. 1970. "Capital Investment in Commercial Banking". *Journal of Political Economy*. 78:1.

Rochet, Jean-Charles and Jean Tirole, "Interbank Lending and Systemic Risk," *Journal of Money Credit and Banking*, November 1996, Pt. 2, pp. 733-762.

Scott, Kenneth. 1990. "Never Again: The S&L Bailout Bill." *Business Lawyer*, June, 45: 1883-1902.

Scott, Kenneth. 1993. "Implementing FDICIA - An Interim Assessment," in George Kaufman and Robert Litan, eds., *Assessing Bank Reform: FDICIA One Year Later*, Washington, D.C.: Brookings Institution 59-68.

Scott, Kenneth and Thomas Mayer, 1971. "Risk and Regulation in Banking: Some Proposals for Federal Deposit Insurance Reform." *Stanford Law Review*, May, 23:5, 857-902.

Sheldon, George and Martin Maurer. 1998. "Interbank Lending and Systemic Risk: An Empirical Analysis for Switzerland." *Swiss Journal of Economics and Statistics*, December, 685-704.

Shriers, Alden. 1994. "Deposit Insurance and Banking System Risk: Some Empirical Evidence." *Quarterly Review of Economics and Finance.* 34: 347-61.

U.S. Congress, House of Representatives, Subcommittee on Financial Institutions, Supervision, Regulation, and Insurance, Hearing. 1984. *Inquiry Into the Continental Illinois Corp. and Continental Illinois National Bank (98-11)*, 98th Cong. 2nd Sess., September 18-19.

U.S. Shadow Financial Regulatory Committee, 2000. *Reforming Bank Capital Regulation*. Washington, D.C.: AEI Press.

U.S. Shadow Financial Regulatory Committee, 2001. "The Basel Committee's Revised Capital Accord Proposal." Washington, D.C., February 26.

Whitehouse, Mark. 1999. "Frustration Soars for Russian Bank Depositors." *Wall Street Journal*, April 8, A14.

Wicker, Elmus. 1996. *The Banking Panics of the Great Depression*. Cambridge, U.K.: Cambridge Press.

Zhou, Ruilin. 2000. "Understanding Intraday Credit in Large-Value Payment Systems," Federal Reserve Bank of Chicago *Economic Perspectives*. 24: 3, 29.